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Trade Outlook.

The foundries are as yet finding it difficult to secure suitable grades of iron in sufficient quantities to meet their requirements. While there is a certain amount of gray forge and mottled irons to be had, the softer grades are scarcer than ever and high silicon iron, which would help the foundrymen to use a certain percentage of undesirable irons, is not to be obtained to any extent that will relieve the situation. Labor troubles and interference with the fuel supply of several furnaces whose output goes to foundries, but helps to intensify the disappointment makers of castings are meeting through furnaces not being able to complete shipments on existing contracts. Sales for 1903 delivery are on the increase, although the jobbing foundries are reported as being averse to placing their orders at this time under prevailing prices, which are not by any means uniform.

We have previously referred to the rapid expansion of the foundry industry during the first six months of the current year. An examination of our records shows that 462 new foundries are under construction or have been projected during this period, which is equal to an increase of 7.68 per cent. This covers all branches of the foundry industry in the United States and Canada, although the latter only shows an increase of a little over 2 per cent. Illinois takes the lead with 47 new shops, or an increase of 11 per cent, Ohio following with 53 new establishments, an increase of nearly 10 per cent, while Pennsylvania, although having 75 new foundries to its credit, only shows an increase of 9 per cent. New York comes forward with 38 new shops, Michigan 29, Indiana 23, New Jersey 20, Massachusetts 16, Wisconsin 15, Iowa 14, California 10, Missouri 10, Tennessee 9, Connecticut 8 and Minnesota 7. These figures while representing numbers only, and possibly not the same increase in capacity, a great part of which will not be available for months to come, still serve to indicate the activity which has prevailed in the foundry trade for some time past.

The greatest surprise of the year comes in the large number of steel foundries that have been projected since the beginning of 1902. At that time there were 73 establishments in the United States and Canada making steel castings, this number including those using the Tropenas and similar processes. We find that exactly 20 new concerns have been organized in this branch of the trade since then, which, as far as numbers are concerned, shows an increase of over 27 per cent. This is to all appearances an abnormal expansion, although it is a well known fact that the demand for steel castings is constantly increasing. The malleable industry in the first six months of the year shows 10 new shops, building or proposed, an increase of 9 per cent.

The Rapid Growth of the Iron Molders' Union.

The statement appears in a recent issue of the *Iron Molders' Journal* that a conservative estimate places the present membership of the Iron Molders' Union at 47,714. In 1879, when internal friction caused dissension and strife in its ranks, this had fallen to 2,854. In 1882 the membership had increased to approximately 8,000, and six years later to 10,000. By

1890, between 12,000 and 14,000 were under its control, and this number remained practically constant during the serious business depression up to 1895. Three years ago there were a little over 27,000 union molders in the United States and Canada. The heavy growth since that time is in a measure due to the efficient work of the present officers as well as to the general expansion of the trade. Pennsylvania ranks first in point of members, followed by New York, Ohio and Illinois. This standing also corresponds with the number of foundries contained in the same states.

The Experience of an American Foundry Foreman Abroad.

Years ago, when the manufacturing industries of the United States did not amount to much, many people were imported from foreign countries to teach our own citizens new handicrafts. This was not always done without arousing considerable jealousy among the native element, although as a nation we are very cosmopolitan in character. Of the six thousand foundries located in this country and Canada a great number are presided over by foremen of foreign birth, without causing the least comment, the British and German predominating with here and there a sprinkling of French and Scandinavians. In late years American foundry practice through specialization is conceded to have made rapid strides forward and competent men thoroughly acquainted with the best methods in vogue here are sought by progressive shops in the old world. The foreman who goes abroad to improve foreign foundry practice has a big job on his hands, however, and is confronted by situations nothing but tact and good judgment will overcome.

A contributor to an English trade journal who signs himself a "tramp" molder, and by the way talks like one, tells of his experience with an American foundry foreman, who had been engaged by the proprietor of an English agricultural machinery plant while on one of his visits to the "states." According to the writer's version the foreman started to work as soon as he arrived, and before he had got his bearings began to condemn most of the equipment to be found in the place as being useless, and his critic concedes that there was a lot of it which was worthless, although claiming that some of it had cost a whole lot of money and was as good as could be made. Right here it seems that the newcomer ran against a snag in the form of the works manager who evidently could see no reason why a stranger should turn everything around, a great deal of which perhaps the manager himself had helped to design. We all know how it goes when superintendent and foreman can not work harmoniously together; there is nothing which will in so short a time disrupt a shop organization as to have those who are supposed to direct affairs quarreling among themselves.

"Charlie, the Yank," as the tramp molder and his shopmates had by this time dubbed their superior, at this juncture ordered some molding machines and opened their eyes as to possibilities in this direction. It seems that the success the "Yank" had in fitting up some of the patterns for the molding machines led the men under him to believe that he was only a pattern fitter, and knew but little about the foundry trade in general, and that therefore he was in no way competent to boss them or give them instructions in regard to the castings they were making outside of the jobs that were turned out on machines. The American is given credit for having obtained good and cheap work from the latter and also for having had a knack of getting into arguments with others, which, by the way, is a fault common to all reformers.

Among the men in this English foundry who seem to have objected to doing things in any other way except their own was the "Boss of the Cupolas, Old Patsy," who it is said knew how to work them and could mix his irons to suit the work to a nicety and was allowed more liberties than any one else in the shop. Most of us are probably acquainted with this type of cupola tenders and a few of them remain in out of the way corners even to this day. It is an easy matter to handle this class of foundry help if you know how to run a cupola, but if you do not it is better to learn how before any changes are proposed, as such a course generally ends in them throwing up their job and there you are, as a rule with no one to fall back upon except yourself. To make a long story short, old Patsy felt sure that he was supreme and was not slow in offering a mild insult to the foreman, egged on to doing so probably by the molders, who had undoubtedly enjoyed any feature which would annoy the latter, who promptly fired Old Patsy on the spot. Right here is where the foreman made the biggest mistake, for, according to the Eng-

lish version of this affair, he hired Patsy back after there had been two or three days' botch-work around the cupola and of course this only tended to make the "Boss of the Cupolas" more independent than ever, and must also have had a bad effect on the rest of the men, who thus learned that the foreman could not afford to act as he thought best in all things.

There is nothing will spoil a shop crew so easily as to let them hold the opinion that you can not get along without any of them if things should come to such a pass. In this instance it is acknowledged that the men made the most they could of the weak spots to be found in the foreman, finally causing him to throw up his job in disgust and naturally the one who follows him will have a rough time if he attempts to institute any reforms, no matter what his nationality may be.

President Fox's Address to the Toronto Convention of the I. M. U.

No meeting of the representatives of the Iron Molders' Union has been as important to the foundry industry as the convention which opened in Toronto, Ont., July 7. When the last convention was held in Indianapolis in 1899 the National Founders' Association had hardly perfected its organization, the foundry industry was just entering the present period of activity, and numberless questions relating to shop methods, which have since come to the front, were then unthought of. While differences have arisen between the officers of the I. M. U. and individual, as well as organized employers of molders, the general impression among foundry operators is that but for the conservative judgment shown by President Fox and his assistant on many occasions, the trade would have been harassed by sectional factions of employes. Under these circumstances Mr. Fox's address to the delegates at Toronto becomes of more than usual interest and as the suggestions contained therein will undoubtedly exert a wide influence upon the policy of the I. M. U. in the immediate future, we reproduce therefrom the following excerpts:

NEW CONDITIONS CANNOT BE IGNORED.

The foundry industry has not, alone among the industries, stood still. It is being developed at a very rapid rate. So rapid, indeed, that our manner of thought and action has not always kept pace. Specialization is the general trend in all industries because of the resulting economies in production; duplication of parts is made possible; and thus is the way paved for the specialist molder and the machine. These are developments well known to every one of you. Upon their existence we are agreed; and it will be to our interest as an organized body of craftsmen to keep them prominent in our mind's eye when discussing the important questions which will be brought to your attention during our deliberations. It will require but little argument to convince the delegates to the Toronto Convention that the Iron Molders' Union of North America could never fulfill its highest functions were it to ignore the new conditions with which it has now to deal, or to attempt to meet them with the methods and thought of a former period. It were the height of folly to think of a reversion to the methods of former times. Much as a retrograde movement of this kind may be desired by some shortsighted people, it will never be; energies expended to that end are energies wasted. The present is with us, the future is before us; we must view their problems not through the reflected light of the past, but with the enlightened knowledge and intelligent appreciation which passing years have brought.

TRYING POSITIONS FOR NATIONAL OFFICERS.

The experience of the past three years may not be duplicated in the lifetime of any of the delegates to this convention. It has been a trying one to the National officers in many ways; mistakes have been made at times; but on the whole the organization has made most satisfactory and gratifying progress. This convention itself bears eloquent testimony to the progress that has been made. Three years ago, when we had but entered upon the trade activity which still abides with us, there assembled in Indianapolis to represent the organized iron molders of America 279 delegates; today, there is assembled to represent the same constituency about double that number. What further testimony is necessary to tell the story of our progress? This convention itself is the best demonstration.

ORGANIZATION NECESSARY TO SECURE BETTER CONDITIONS.

The work of organization is properly regarded as one of the chief functions of a trade union of any craft. The more perfect and complete it is the more successful will the trade union itself become. The term now concluded has been a most successful one in our organiz-

ing work. When the skill of the molder is in demand and foundrymen are eager to purchase it, when the price of the necessaries of life increases in cost, the gospel of organization can be made to penetrate the dullest intellect by its tireless expounders. In the three years which have elapsed since the Indianapolis convention 158 new charters have been granted, 31 of which have since lapsed; and, placing it at a conservative figure, we have sustained an increase of membership approximating 22,000. Our increase alone would have been considered, a few years ago, an ample organization. This remarkable increase in membership brought with it additional responsibilities. In a large number of cases organization was prompted by a desire to secure a betterment of conditions—a fact which should not be lost upon us as emphasizing the point that, without organization, the workman remains at the mercy of his employer, be the times good or bad. In many instances betterment was secured without serious friction, while in others a fight was immediately forthcoming. In either case, the services of our vice presidents were in demand to advise and direct the efforts of our recruits. The success which has attended our efforts has been most gratifying, and numerous localities are today enjoying a fixed rate of wages in the setting of which the molders had a voice, where formerly they were paid according to the whim or will of their employers.

THE LOW PAID DISTRICTS OF PENNSYLVANIA AND THE SOUTH.

[Mr. Fox refers to the efforts made to improve the condition of the molders in the low-paid districts of Pennsylvania, the foundries of which were offering serious competition to the better paid centers, such as New York, Philadelphia and vicinities. This resulted in a ten months' strike at York, Pa., and while this in itself was not entirely successful, it resulted in a large number of molders, indirectly affected, securing substantial advances without resorting to a strike.

The attempts made to secure greater recognition for the union in the Southern states has not been as encouraging as might be expected, especially in the jobbing foundries. While the chief centers have capable locals, several of the smaller ones, whose membership is scattered over a comparatively wide territory, have been unable to maintain fair wages and conditions. In the New England states much progress has also been made in forming the molders into an organized body.—Ed.]

YEARLY AGREEMENTS FAVORED.

While organization is one of the chief functions of a trade union, it is self-evident that it is not its ultimate purpose. United action must be assured before its purpose—the betterment of its members—is attainable. Better wages and better conditions of labor logically follow better organization. It has been so with us. In the short paragraph at our disposal it is impossible to do adequate justice to the recital of wage advances and improved conditions which have been secured to our members in every section of the jurisdiction since the Indianapolis convention. In the spring of 1899 the example was set by Cincinnati, Cleveland and other important centers of establishing a minimum rate which should hold good for the period of one year. This policy was encouraged by the National officers, and has now become a very general procedure, advantageous alike to our members and their employers.

Advances in the wage rate were very general throughout 1899 and the early part of 1900. Such important foundry centers as those of Chicago, St. Louis and Buffalo, which had suffered severely both in wages and conditions during the depression, were aroused to activity, and by careful handling were enabled to establish minimums under agreements with the foundrymen. The smaller cities were not slow to follow in the wake of the larger ones, and advances soon became general.

BEST WAGES AND CONDITIONS THE MOLDER HAS BEEN ACCORDED IN TWENTY-FIVE YEARS.

While in a city like Cleveland, which began 1899 with a good organization and a recognized minimum, the advance in the minimum rate has been about 18 per cent since that time, these figures do not convey an adequate idea of the advances that have been secured, for even in that city the number of molders receiving more than the minimum rate has very largely increased. It must be remembered, too, that in many of the localities now recognized as well organized foundry centers, the minimum rate set by local unions was not generally recognized in the foundries under their jurisdiction, and, in most cases, the majority of molders were working for less than the union rate and under conditions which were, to say the least, deplorable, when the present trade activity began. These have been organized and advances secured which have brought them up to the highest level. In many instances they have been raised from the wage

status of the laborer to that of the skilled mechanic.

These remarks apply more particularly to the experience of our locals identified with the jobbing and machinery branches of the trade. Under our conference arrangements with the Stove Founders' National Defense Association, the advance of 10 per cent on 1898 prices has been supplemented by a further advance of 5 per cent in 1900, and 5 per cent additional on April 1 of the present year. Thus the stove plate branch of the trade has sustained a flat advance of 20 per cent, which, with the numerous readjustments of low-paid work that have been made possible by buoyant trade conditions, represents a very substantial increase in the earning power of our members who follow this branch of the trade.

Our members engaged in other lines than those specified have also profited by organization and are today enjoying a higher rate of wages. In summing up I believe I do not exaggerate when I say that the members of the Iron Molders' Union today are enjoying better wages and better conditions—for conditions improve with wages—than they have done at any time during the past twenty-five years.

AGREEMENTS OF VALUE TO BOTH SIDES.

Our observations and experiences during the past term, when wage advances were so prominent a feature of our work, confirm me in the belief that wage agreements covering a specified period are desirable. They insure a period of peace for the prosecution of the no less important work of the union, and introduce an element of certainty into the industry which is of positive value to both the molder and his employer. It is my earnest hope that this view will meet with favor in this convention.

PERMANENT RESULTS OF MORE VALUE THAN TEMPORARY GAINS.

It is quite true that although the improvement in the wages and conditions of our members have been most marked during the past term, some have protested with emphasis, at times, that we were not moving forward fast enough. That thought has sometimes thrown our members in some localities and the National officers into seeming antagonism. As a general rule, sounder judgment has prevailed and harmony has been restored; but still we are aware that there is an impatient element among our membership, who are loud and insistent in their denunciation of the National officers as bars to their progress; and another, though inconsiderable portion, who carry their traduction to the point of charging partiality to the interests of the employers. How absurd, illogical, not to say uncharitable, such an attitude is, must be apparent to any one who will give the subject a moment's thought. The truth of the matter is that those impatient ones have not yet realized that no movement can advance too rapidly without inviting disaster. My every effort, my every energy, has been devoted to promoting orderly and substantial progress and establishing conditions that might endure, rather than to furthering a policy which, succeeding for a moment, is followed by a reaction that loses for us a portion of what we originally held. The policy of an organization of the standing and experience of the Iron Molders' Union of North America should be to build a substantial structure and not a castle of cards. The path of the labor movement is strewn with the wrecks of labor organizations, the victims of unrestrained, misdirected enthusiasm. The experience of others, nay, our own experience! demonstrates clearly that in attempting to push ahead too fast, defeats are encountered or wounds received which discount whatever of success might attend our efforts and materially lesson our ability to protect our members and further promote their interests.

SHORTENING THE WORKING HOURS OF THE DAY.

At the time of the Indianapolis convention it was ordered that a vote of the membership be secured on the proposition to establish an eight-hour day. The vote resulted, 12,367 in favor and but 796 against. That result was conclusive enough, but the problem of how to put it into practical effect, it will be admitted, was a serious one. At the meeting with the representatives of the S. F. N. D. A., which took place a month after the result of the vote was known, the question of an eight-hour day in the stove foundries was brought up for discussion and, as anticipated, met with very pronounced opposition from the manufacturers, and nothing of a substantial nature was accomplished. Meanwhile the stirring occurrences of the early part of 1900, involving wage advances, completely engrossed the attention of our members in the machinery branch of the trade. Then followed the long strike of No. 218, Cleveland, O., which for nearly eight months was a severe tax upon our resources and precluded serious attention being given to the shorter work-day movement.

ADVISED AGAINST SYMPATHETIC STRIKES.

In May, 1900, the National Metal Trades' Association and the International Association of Machinists entered into an agreement, which among other things, provided for the inaugurating of a nine-hour work-day in the shops of the members of the association on May 20, 1901. From the dissatisfaction expressed with certain features of this agreement and misunderstandings as to its meaning which subsequently developed, I anticipated that the nine-hour day would not be inaugurated in the machine shops without serious trouble; and, in every instance where our locals asked for advice upon the proposition of taking part sympathetically in the machinists' movement, I strongly advised against it. With the exception of our locals in San Francisco and several points in the northwest the advice was heeded, and the final result proved its wisdom.

Although it might be thought this was an inopportune time to agitate a shorter work-day in the foundry, we nevertheless tested the sentiment in the central west and found that, with the exception of St. Louis and one or two smaller places, there was a preference for a further wage advance.

NINE-HOUR DAY GAINING GROUND.

The machinery molders of Pittsburg have had the nine-hour day for a number of years, and during the agitation of 1901 several of the surrounding localities profited in the same direction. No. 196 entered into an agreement with the foundrymen of Youngstown, O., whereby a nine-hour day became operative on January 1, 1902; the jobbing foundries of Boston and vicinity also succeeded in reducing their work-day by one hour; and early in the present year the conference board of New York and vicinity set out in a masterly way to accomplish by peaceful means the same result for the locals in its jurisdiction; and, it affords me pleasure to say, with complete success. Other localities are even now moving in the same direction. Thus passing events, the voluntary action of local unions, and what appears to me a more intelligent appreciation of the shorter work-day movement, justifies the policy of devoting our energies towards the establishment of a nine-hour day in the foundry, in preference to that of attempting to establish an eight-hour day at one move. So imbued were we with the wisdom of this policy that when the atmosphere had cleared after the complications of the summer of 1901, the nine-hour day movement was given the encouragement and support of the National officers wherever general conditions favored its success; and with gratifying results, thanks to the good judgment displayed by the members affected. In every instance of which we are aware the nine-hour day was secured without reduction in pay.

N. F. A. OPPOSED TO SHORTER HOURS.

At a conference held with representatives of the National Founders' Association last April, our representatives were instructed to make a strong plea for the establishment of the nine-hour day. I regret to say the proposition did not meet with a great deal of favor from the foundrymen's representatives.

CONFERENCES DO MUCH GOOD. REDUCTION OF HOURS PREFERABLE TO INCREASED WAGES.

It has been a subject of considerable gratification to me to note that this year sentiment has set in the direction of a shorter work-day in lieu of further advances in the minimum wage rate. In my opinion a reduction in the hours will be a more substantial gain than an equivalent advance in wages. Wage advances are subject to future trade fluctuations, whereas, on the other hand, the shorter work-day would be a permanent gain. I strongly urge upon this convention, therefore, that it indorse the nine-hour movement. I counsel you, however, to profit by the experiences of our own locals who have taken the lead in this direction, and by the experience in 1901 of a kindred trade, when shaping your policy. No good comes of high sounding, defiant resolutions, nor of threats to inaugurate a general strike to carry out our purpose; such a strike would, in my opinion, be most unwise and could result in nothing but a further retarding of a movement that is now making healthy progress. I believe in the efficacy of friendly conferences with the foundrymen in a movement of this kind, and in taking advantage of opportunities as they present themselves. There are foundrymen who violently oppose any effort to shorten the hours, but there are others in sympathy with the movement and friendly conference often enables us to turn that sympathy to practical account and to give every interest a fair hearing. The time is ripe for a shortening of the hours of labor in the foundry, and our local unions should be encouraged to give preference to an effort in that direction during what remains to them of trade activity. I feel, too, that the first logical step in the shorter work-day movement is the establishment of a nine-hour work-day, and I

therefore strongly recommend to this convention that it place itself upon record as favoring an effort to establish it in the foundry.

THE APPRENTICE RATIO.

Following the conference held with the representatives of the S. F. N. D. A., in the spring of 1901, a very interesting discussion took place upon the ratio of apprentices to journeymen. A vote was finally taken upon a proposition to establish a one to five ratio, and upon another to establish an intermediate ratio between one to five and one to eight. A referendum vote, in which, I regret to say, only about two-fifths of our membership recorded their votes, resulted in the one to five proposition being defeated by a vote of 15,842 against 504; and the second proposition by a vote of 12,314 against 3,978. While this vote might be interpreted to indicate the fixed determination of our members to abide by the ratio which has been embodied in our laws for more than a quarter of a century, I deem it my duty to bring the subject prominently to the notice of this convention, believing, as I do, that our very best interests demand that we give it our most unprejudiced and intelligent attention.

LACK OF INTEREST SHOWN BY MEMBERS.

While the referendum vote is undoubtedly founded upon correct principles, the result of its use in labor organizations has not always been in harmony with progressive thought. It is an unfortunate fact, but truth compels me to say it, that our members do not give important questions submitted to their decision the careful study and intelligent thought they should, but allow themselves to be swayed by their prejudices or their fears, or display by their indifference and their failure to record their opinion their lack of interest in propositions submitted. In my experience with the Iron Molders' Union, and it is the experience of nearly every labor organization, it has devolved upon the higher intelligence of the leaders of our membership in convention assembled to initiate important reforms or take advanced ground in our movement. Let me cite as an example the decision of the Chicago convention in 1895, which converted the Iron Molders' Union into a high dues organization. Had such a proposition been submitted to a referendum vote, there is not the slightest doubt but that the change would have been overwhelmingly defeated. And yet, today, even those who were loudest in condemnation in 1895, will admit that it was the wisest step ever taken. I feel justified, therefore, in appealing the ratio of apprentices' question to this convention.

UNION RATIO NOT UNIFORMLY ENFORCED.

In considering the subject of a ratio of apprentices, we must bear in mind these points: The ratio of one apprentice to eight journeymen is a law of the Iron Molders' Union, but is not assented to as equitable by any association of foundrymen or any employer, with but few exceptions; and is only recognized where the union has the power to compel its recognition. Thus it is an ever-present danger point in our relations with our employers in prosperous seasons, and is honored more in the breach than the observance in periods of depression. I am not insensible to the force of the argument that there are employers who would, without scruple, hire low-paid boys in preference to men were there no restraint upon them; and that knowledge, together with the reasons previously advanced, has convinced me of the desirability and advantage of a ratio which will be assented to and enforced by the best element of foundrymen, in preference to the present policy of recognition when conditions permit its enforcement. There are two parties to every bargain, legitimately ratified; and if we would win the recognition of the foundrymen for a ratio of apprentices, we must give consideration to what they deem their interests as well as our own, and be prepared to liberalize, if necessary, the present ratio which, I have no hesitancy in saying, can be done without serious injury to our interests.

THE TRADE NEEDS MORE MOLDERS.

As you are well aware, the ratio of apprentices has become a very prominent subject of discussion with the members of the S. F. N. D. A. As a result of the conference agreements which have been a feature of our relations with that body since 1891, strikes, a prolific source of supply of molders, have largely disappeared in the stove-plate foundries, and the supply, we hope, will soon be dependent upon the union ratio. It is to be expected that should this convention determine to increase the present ratio of apprentices or empower its representatives to negotiate with foundrymen's associations, a ratio mutually agreeable, there would be considerable discontent and complaint at the outset; but so confident am I that such a policy will result in turning out mechanics of greater competency, operate to the material advantage of this union, and establish much desired uniformity, that I sub-

mit to you my strong recommendation to liberalize the present ratio of apprentices and conform it, intelligently, to the needs of a growing industry.

STOVE FOUNDERS' NATIONAL DEFENSE ASSOCIATION.

[Reference is made by Mr. Fox to the pleasant relations which have characterized the meetings between representatives of the S. F. N. D. A. and the I. M. U. Twenty per cent advance has been granted in stove molding prices since 1898, and in but few cases has a strike been necessary to secure uniform wages for all connected with this branch of the trade. Although the association does not include all stove manufacturers the decisions reached at the annual conferences upon the question of wages is accepted as a standard for the trade. In justice to the stove founders paying the union scale the molders were forced to strike at the Black & Germer shop, at Erie, Pa., in April, 1900, and this contest is as yet unsettled. President Fox also calls attention to the result of the annual conference of the S. F. N. D. A. and the I. M. U. held in Chicago during March of this year, which includes a special agreement in regard to employing more than the union ratio of apprentices under special conditions. A report of this will be found on page 86 of the May issue of THE FOUNDRY. —Ed.]

THE NATIONAL FOUNDERS' ASSOCIATION.

The National Founders' Association, which apparently aims, to include in its membership all foundrymen who are not members of the S. F. N. D. A., has grown considerably in membership since my report to the Indianapolis convention. At that time we indulged the hope, notwithstanding little differences that had already developed, that as both parties got better acquainted through conferences and adapted themselves to the policy outlined in the New York agreement, our efforts to promote peaceful relations and orderly progress would be attended with the same success as had been achieved with the stove manufacturers. I regret to say that such has not been the case and today the relations of the two associations are not imbued with that spirit which is essential to the fullest success of the principles enunciated in the New York agreement.

Numerous wage conferences have been held with representatives of the association, and, while some of these were very unsatisfactory to us, I feel justified in saying that, as a whole, they have operated to the advantage of our members and have been a powerful factor in promoting our efforts to raise the general wage level, and especially that of the smaller towns and cities in our jurisdiction and to place them upon a more equitable comparative basis with the larger centers.

DIVERSITY IN OUTPUT A BAR TO AGREEMENTS.

The membership of the association is of a very diversified character and that has operated most disadvantageously in negotiations affecting important matters of policy. The principle of a minimum wage was originally opposed by the association's representatives. This position was modified later and the principle of a minimum or standard wage, as they call it, was admitted to be equitable, providing differentials were allowed upon those grades of work which require very little skill on the part of a molder. Wherever the effort has been made to advance the minimum in the better paid localities this contention for a differential on low grade work has been vigorously advocated by the association's representatives. The higher the minimum, the more insistent those demands become. During the conference which settled the Cleveland strike, a proposition was submitted to the union's representatives which contemplated the establishment of a minimum rate, with the further understanding that a certain percentage of the molders employed should receive 25 cents less per day and a similar percentage 50 cents less. This, of course, could not be agreed to as a general proposition. It was designed to cover bench molders and those who might be employed on inferior work; and here it might be well to say the National Founders' Association has always taken a most determined stand in favor of a differential between bench and floor molders' wages.

NOTICE SHOULD BE TAKEN OF THE SPECIALTY SHOP.

While your representatives have never looked with favor upon the suggestion of recognized differentials general in application, I believe it is an idea which should be carefully weighed by this convention. As I have already said, there are developments in the foundries of today that were unknown a few years ago. The specializing trend has changed the complexion of many of them. It is therefore the part of wisdom to adapt our policy to the new conditions, wherein it may be found possible to do it with safety to our interests. I do not wish to be construed as favoring an attempt

to grade our membership, for that, in my opinion, would involve us in endless complications, would create intense dissatisfaction, and would finally be discarded as impractical. But in establishing minimum rates, especially when they approach the higher ranges, we should be careful to use wise discrimination when there is a class of work of very inferior grade included, and upon which molders are employed who are adapted for that class of work only. Circumstances over which we have no control are creating a class of molders capable of distinct classification from that of the all around mechanic or jobbing molder for whom we have been accustomed to legislate, and our policy, I repeat, should be such as will enable us to take intelligent cognizance of these developments.

THE DETROIT RESOLUTIONS.

The spring of 1900 was one of great unrest in the machinery branch of the trade, and flushed with the memories of the splendid activity which marked the latter half of 1899 and the earlier months of 1900, our members in the large centers of the central west were bent on securing further advances. A temporary reaction had set in, however, which the foundrymen were quick to see and they, therefore, stubbornly opposed the advance. Cincinnati, Chicago, Cleveland and Detroit were the storm centers. After futile attempts at agreement in each of those cities, a national conference, held in Cincinnati, on May 1, 1900, finally succeeded in effecting a temporary arrangement subject to the final decision of a national conference, to be held in June. At the Cincinnati conference and the later one, representatives of the interested locals were present.

In June the conference held in Detroit could not agree upon the wage question, but one of the developments was the presentation of what are familiarly known as the "Detroit" resolutions, by the representatives of the N. F. A. As they have since been given great publicity it is only necessary to say that they were declarations which enunciated the absolute right of the employer to dictate conditions under which labor must be performed; which required the employe to work "peacefully and harmoniously" with every other employe without regard to his trade union affiliations; and, in fact, proclaimed the absolute right of the employer to dictate conditions of labor to his employe.

Our representatives vigorously and unflinchingly opposed these pernicious doctrines and in a series of counter resolutions maintained equality of rights for the workman in negotiating both wages and conditions of labor, and the privilege of the organized worker to determine with whom he should work in peace and harmony.

CLEVELAND STRIKE AND THE N. F. A.

When the conference adjourned it was felt on every hand that a serious conflict impended. The foundrymen's resolutions discovered the fact that our union must prepare to defend cardinal principles; and nobly was the crisis met by our members. It was determined that Nos. 218 and 311, of Cleveland, O., should be our standard bearers, and on July 2 following, the Cleveland strike was inaugurated, nominally in resistance of a reduction of 10 cents per day, but actually in resistance of the provisions of the foundrymen's "Detroit" resolutions which it was sought to apply in the Cleveland foundries. For seven months and a half the strike continued, and when settlement was reached the obnoxious resolutions ceased to be operative in the Cleveland foundries, and have never again been brought forward as a code to which our members must conform.

It was during the Cleveland strike that the N. F. A. card first came into prominence. It was a certificate given to non-union molders for faithful service rendered to the association in time of trouble, and was supposed to insure the holder favorable consideration from all members of the association. Very little is heard of this card just now, but the fact is well known that there are a number of these mercenaries constantly in the employment of the association and ready at all times to do its bidding. This knowledge, together with the ill-disguised bitterness and antagonism still displayed by some of the members of the N. F. A. towards the union and its representatives, has contributed a great deal towards retarding the growth of cordial relations. It is but fair to say, however, that the number who now display hostility to the union or its representatives is less than was the case at the beginning of our relations, and that some of those who harbored erroneous views concerning the Iron Molders' Union when we first became acquainted, entertain modified views today as a result of our intercourse under the New York agreement.

LACK OF HARMONY WITH N. F. A.

In summing up, I can not say that our relations with the National Founders' Association, during the past two years, at least, have

been entirely satisfactory. We seem to be very far apart on many important points, with little immediate prospect of being able to harmonize our views. Unfortunately, too, much has occurred to inspire mutual dissatisfaction and distrust, and to imbue our members with the thought that the association was devoting its efforts not to promote but to impede orderly progress.

I am, as you all know, a firm believer in the policy of employer and employe meeting in friendly conference to discuss their differences, and it pains me much to say anything that can be construed as opposed to that thought; but strong conviction compels me to say that unless the Iron Molders' Union and the National Founders' Association can more nearly harmonize their views upon their respective rights than they have yet succeeded in doing, and are inspired with greater confidence in the design of each to deal honorably with the other, their efforts to amicably adjust their differences can not meet with very gratifying success, and the failures which are encountered will, of necessity, tend to create a sentiment injurious to the policy of conciliation which they have attempted to establish through the medium of the New York agreement.

THE NEW YORK AGREEMENT.

Our relationship with the N. F. A. may be said to have first begun with the ratification of the New York agreement, in March, 1899. The following are its terms, the preambles being omitted:

That in the event of a dispute arising between members of the respective organizations, a reasonable effort shall be made by the parties directly at interest to effect a satisfactory adjustment of the difficulty; failing to do which, either party shall have the right to ask its reference to a Committee of Arbitration, which shall consist of the Presidents of the National Founders' Association and the Iron Molders' Union of North America, or their representatives, and two other representatives from each association appointed by the respective Presidents.

The finding of this committee of arbitration, by a majority vote, shall be considered final in so far as the future action of the respective organizations is concerned. Pending adjudication by the committee on arbitration there shall be no cessation of work at the instance of either party to the dispute. The committee of arbitration shall meet within two weeks after reference of the dispute to them.

VIOLATIONS OF THE NEW YORK AGREEMENT.

Throughout 1899 and the early part of 1900 the procedure set forth in these resolutions seemed to give very good satisfaction and to operate advantageously to all interests. The rupture of friendly relations in July, 1900, and the failure of three Cleveland foundrymen to fulfill the terms of settlement of the Cleveland strike, seriously disturbed the faith of our members in the association, a feeling that naturally communicated itself to the New York agreement, to which the association was a party. The complications arising from the Chicago strike of last year still further intensified this feeling; with the result that since the Cleveland strike, our efforts to amicably adjust disputes with representatives of the association have not been as successful and satisfactory as was the case previous to the rupture of friendly relations in July, 1900.

There are very few, indeed, among enlightened trade unionists who will not subscribe to the conciliatory attitude of employer and employe contemplated in the New York agreement, but there has developed a disposition among the members of the association to insist upon certain privileges as a matter of right, and to regard the carrying out of their will in these matters as no violation of the spirit of the agreement, even though emphatic protest be raised by our members. This is contrary to the intent and purpose of the New York agreement, and can not be acceded to. It is not in accord with an intelligent conception of arbitration that either of the disputants should be privileged to enforce their will first and arbitrate afterwards; and that view your representatives have steadfastly maintained upon every occasion.

ALL AGREEMENTS MUST BE CARRIED OUT.

Notwithstanding the discouraging features of the proceedings under the New York agreement, as intimated in these remarks, I have esteemed it to be the duty of the officers of the organization to make an earnest effort towards fulfilling our obligations under its terms, at all times. This has sometimes aroused very serious complaint and dissatisfaction, and caused the more thoughtless of our members to make ridiculous charges against the national officers, but I desire to impress it deeply upon the minds of the assembled delegates that no labor organization of any standing can afford to wilfully violate agreements or undertakings to which it has become a party. If it does, it loses materially both in prestige and in the es-

timation of the public, and can not expect to be regarded as a responsible party with whom to make agreements in the future. The only safe policy, the only honorable one, is to faithfully carry out all agreements regularly entered into, until they expire by time limitation or are abrogated. That has been the steadfast policy of the present administration of the Iron Molders' Union, and it is my sincere hope that it will be indorsed and perpetuated by this convention.

Within the limits of this report I can not touch upon all the features of our relations with the National Founders' Association or the agreement which established those relations, but it will devolve upon this convention to say whether we shall continue to make an effort to arbitrate our differences with the members of that association; and, if the decision be in the affirmative, to devise means whereby local unions will be compelled to carry out their obligations under national agreements to that end.

THERE WERE MANY STRIKES.

[While the stove plate molders secured advances with little friction or expense to the union, Mr. Fox notes that other branches of the trade were not so fortunate. The Cleveland strike, lasting seven and a half months and involving 596 journeymen and 80 apprentices, was a stubbornly fought contest which cost both sides much money and in the end left matters practically unchanged. The strike of the San Francisco molders was not sanctioned by the national officers and was declared off at the end of nine months and a half without securing for those engaged therein any material advantages.

Another independent strike is the one declared by the Chicago molders against the advice of the executive officers of the national body. This began almost a year ago and while its object to establish a $3.00 minimum for floor and bench molders has been successful in a number of the smaller foundries, several of the larger shops have been lost to the union while others are operated with but little regard to uniformity of wages and conditions. —Ed.]

WHY THE CHICAGO STRIKE WAS NOT SANCTIONED.

As I have already intimated, immediately it became known that the Cleveland strike was settled, a number of localities came forward with demands for which they desired the sanction of the executive board. Among them were Cincinnati, Milwaukee, Detroit, Chicago, and St. Louis, centers which, with Cleveland, had hitherto advanced together and were at that time upon the same wage basis. They, in common with many other localities, had been compelled to hold back during the Cleveland strike in order that the organization might be enabled to concentrate its efforts upon that point. By common consent, action upon these demands was deferred until the June conference had acted upon the Cleveland wage rate, it being generally felt that, as in the past, a settlement reached in one of the cities named would form a basis of settlement for the others. No settlement was reached. The Chicago conference board had determined not only to secure an advance, but also the elimination of the differential of 25 cents per day between the wages of bench and floor molders, which had existed in that city and vicinity for many years. The disturbance of the differential of itself excited the strongest opposition on the part of the foundrymen, especially the members of the N. F. A., who were supported in their position by the policy of their association. Unfortunately, too, the entire iron industry was in a most disturbed condition. The machinists' nine-hour strike had thrown large numbers of our members out of work all over the country. In Milwaukee, alone, while the Chicago wage conference was in session, representatives from that city reported that in the neighborhood of 400 molders were in idleness. The end or ultimate result of the machinists' strike upon the foundry industry could not then be definitely determined, and still further complications were threatened by the prospect of a general strike of the Amalgamated Association of Iron and Steel Workers.

The executive board realized that if a considerable portion of the 1,400 men who would be affected by the Chicago wage demand had to be supported in a strike for any length of time, it would again be necessary for the other cities interested in the question of an advance to stand aside as they did during the Cleveland strike, until perhaps the season was so far advanced as to render it impractical to force the issue, and they would receive no advance at all.

And finally there was the urgent necessity of doing something for the low paid districts while yet there remained a prosperous condition of trade. The board felt, and in my opinion, very properly so, that all of the period of trade activity and all the resources of the organization should not be devoted to advanc-

ing the large and comparatively speaking well paid districts, whose position must remain insecure so long as the poorly paid districts were unattended to.

These four reasons then—the danger of cementing the forces of the N. F. A. in resistance of the elimination of the differential between the wages of bench and floor molders and the inauguration of another bitter and protracted strike; the disturbed and unfavorable condition of the iron industry; the desire that all the large cities should share in whatever advance was granted; and the determination to do something towards redeeming the low paid districts, were among those which determined the executive board to accept the offer of $2.85 for floor and $2.65 for bench molders in Chicago. These reasons were rejected by the Chicago molders, who refused to consider the interests of any locality but their own, and it now remains for this convention to say whether the situation and the interests of the whole organization justified the national officers and the executive board in their decision.

OBEDIENCE OF UNION LAWS NECESSARY FOR SUCCESS.

The Cleveland strike demonstrates the power of resistance possessed by a local of the Iron Molders' Union when it is called upon to defend the integrity of the union itself and is accorded the united support of the national body and its numerous locals. And, further, it shows how spontaneous, how liberal, and how substantial that support will be. The cause in this case was a good one, its defenders worthy the cause, and the organization faithful to both, as it always will be.

The strike in San Francisco should warn us of the danger that lies in permitting our enthusiasm for a worthy cause to induce us to disregard the laws that have been prescribed for our government and the advice of those vested with the authority of their administration. More than that, it emphasizes the folly of transferring our allegiance from the executive board of the Iron Molders' Union to a foreign organization with little responsibility and limited resources.

And finally, the Chicago strike exemplifies the disintegration and disaffection that must be expected to ensue from utter disregard of law and constituted authority, and has brought home to the organization itself the evil influence of a bad example left unpunished.

The Chicago and San Francisco strikes of 1901 are the first instances in many years wherein locals of the Iron Molders' Union have persisted, as a body, in an attitude of open defiance of the National Union. Of these two, the Chicago strike was the most aggravated and, I regret to say, has stimulated many other locals to attempt the same policy. As a result of the appeal circulars sent out by the Chicago conference board and the accounts which they contained of success achieved, we have had to contend with more cases of threatened insubordination than ever before in a similar period of time.

CENTRAL AUTHORITY NEEDED.

I trust the danger of such a spirit will be appreciated by this convention as it has been by its predecessors. There are some who still think local unions should be empowered to declare a strike, and in rebuttal I need but urge that it has only been since local unions have been restrained from doing so that the Iron Molders' Union has made substantial progress. The trend in trades unions as in industries, in this twentieth century, requires that general direction of their affairs be vested in some central authority. It can easily be imagined how hopelessly we would have been involved had it been given to local unions to inaugurate strikes without sanction or investigation during the past term, and what a shattered remnant of this magnificent organization would have been represented here today. The present law does not satisfy those who would "rule or ruin," nor those who have not yet learned the virtue of self restraint, but I say without fear of successful contradiction that more disaster, more utter ruin has come upon labor organizations by hasty strikes than from any other cause.

DEFIANCE OF LAWS SHOULD BE PUNISHED BY EXPULSION.

Discipline is essential in a trade union. Indeed, its power and its success are largely measured by the degree of discipline which is observed by its members. That fact is recognized by every one of the substantial and experienced labor organizations of this country. Where you find no restraint and absolute liberty to strike at will, you find a weak organization. If, then, we would preserve our present prestige and power and continue to make enduring progress, we must impress upon every local and every member who enrolls himself under our standard that obedience to the law and those who are authorized to administer it is the first duty of membership, and that

prompt punishment awaits either local union or member who violates it. No local union is so large as to be superior to the union itself. I, therefore, earnestly recommend to this convention, not only to preserve the principles embodied in Article VII, Section 2, of the constitution, but to so amend and strengthen them that it shall be mandatory upon the president and executive board to withdraw the charter of a local union whose members ignore the law and the executive officers of the Iron Molders' Union, and persist in an attitude of defiance and disobedience to both.

THE UNION MOLDERS' ATTITUDE TOWARDS THE MOLDING MACHINE.

It was my privilege to call the attention of the Indianapolis convention to a growing problem of our craft—the molding machine. During the remarkable trade activity which has been a feature of the past three years, the rapidly increasing demand for the products of the foundry has stimulated the introduction of molding machines where duplication of work made them profitable. The higher minimums which have been established have also tended to promote their use in the foundry. Laughed at some years ago, the machines have demonstrated their usefulness, and few there are among the molders who will deny their success or their economy on classes of work for which they are adapted.

It is no longer the simplest kind of work that is made upon the molding machine, for every year has seen an extension of its sphere, until today work of a very high grade is being made successfully upon them. As the grade of work made upon the molding machine improves in quality, it follows that a higher degree of skill is required of the operator. Thus, in some instances, foundrymen have found it more profitable to employ journeymen molders as machine operators upon the better class of work.

Becoming alarmed, apparently at the attention given the machine question by the Indianapolis convention, and misinterpreting our purpose to mean a limitation of its output, if not actual opposition to its introduction, the foundrymen, especially members of the National Founders' Association, have determinedly opposed the proposition to employ molders as operators except, as stated above, where their skill was absolutely essential to successful operation. At several conferences with representatives of the association we have sought to reach an understanding whereby molders will be given preference as operators, but without success.

MACHINE OPERATORS ORGANIZED.

No good purpose will be served by deceiving ourselves as to the measure of success that has attended the experiment of the foundrymen in educating bright young men to be machine operators. On the common run of work they have been fairly successful, and these so-called "unskilled" operators have in time become highly trained specialist molders. Taking that view of it, the executive board, at a meeting held in Cincinnati during September, 1901, determined to make a new departure, and granted a charter to the machine operators of Indianapolis, Ind., who were admitted to membership subject to certain limitations. I am glad to be able to say the experiment has proven very successful; wages have been advanced, the local has made satisfactory progress, and is today represented by delegate in this convention as Machine Operators' Union No. 382.

The demand for skilled molders will not always be as great as it is today, and we can well conceive the time when the molder who would now refuse to take a job as a machine operator will be glad of the opportunity. I desire to emphasize one point, however, and that is, he will never be given that opportunity unless he is willing to do justice to the possibilities of the machine and shows a willingness to conscientiously assist in its development. Our original attitude towards the machine was a shortsighted and mistaken one, and the resulting injury to our own interests cannot be removed by a perpetuation of the early prejudice. The foundry industry is developing and our union must adapt its policy to the changing conditions or fall into decay.

It is manifestly to our interest to protect the machine operator in his wages and to assist him in securing a wage commensurate with his output and skill. After giving the different phases of this question the most careful thought, and discussing them with my colleagues, I am prepared to recommend to this convention that it make provision whereby competent machine operators will be accepted into membership of the Iron Molders' Union, subject to such provisions as may be deemed in the best interest of the craft.

RELATION WITH KINDRED ORGANIZATIONS.

[Reference is made by Mr. Fox to the attempts to bring the molders' and core makers' unions into closer relation, which have so far resulted in no permanent agreement between

the two organizations. Owing to the close relationship between the molder and core maker and the embarrassments which follow when the two do not work in harmony Mr. Fox is of the opinion that the interests of both crafts, as well as of the employer, can best be conserved by uniting the core makers and molders under one head.—Ed.]

The plan of forming a closer alliance between the metal trades for greater protection and assistance in time of trouble, which has resulted in the formation of the Metal Trades' Federation is touched upon by Mr. Fox as follows:

DANGER IN AFFILIATION WITH OTHER TRADES.

I realize that our interests lead in the direction of close alliances with kindred trades; but, from a careful survey of the Metal Trades' Federation, I am inclined to the thought that it will not be prolific of practical results. Among the organizations in affiliation are some who are not only very young in the movement, and consequently very inexperienced, but inherently weak and unable to withstand a serious attack. This weakness must necessarily communicate itself to any combination of which they are a part, and prejudice its movements. In addition to this it might be urged that while the constitution of the federation expressly provides for careful investigation and consideration before a general strike is undertaken, our affiliation with the several metal trades would materially increase the danger of our local unions becoming sympathetically involved in the numerous unauthorized strikes in which their members, apparently without much effort at restraint, become involved. For these reasons, I am of the opinion that our interests will be best served by remaining out of the Metal Trades' Federation and concentrating our efforts towards strengthening our position in the foundry itself.

LIMITATION OF OUTPUT.

One of the most popular charges against trades unionism is that it designs to arbitrarily limit output and to oppose the introduction of systems and devices designed to increase the productivity of the workman. Employers' associations have used this very effectively of late years in their efforts to discredit trades unionism in the minds of the public. That the charge is, in the main, unjust, needs no argument of mine to convince this convention. The Iron Molders' Union has taken the ground, and will maintain it, that it will countenance neither arbitrary and unreasonable limitation of output on the part of its members, nor equally arbitrary and unreasonable exactions on the part of an employer. It is as much the function of a trade union to protect its member against demands for an excessive day's work as it is to protect him in his wages. We can not as workingmen consent to be driven like slaves to the point of exhaustion, nor to tamely submit to exactions which shorten our lives and prematurely incapacitate us for useful toil. Yet were the policy advocated by some employers pursued without restraint, there can be no question but that early incapacity and premature death would be the lot of many workingmen. Numerous plans have been devised, which, by appealing to his cupidity, stimulate the workman to greater effort. Legitimate to a certain degree, we can foresee but one ultimate result from these schemes—an excessive day's work.

LIMITATION OF EARNINGS A FAILURE.

In an effort to resist this tendency some of our locals have put forth misguided efforts and have given color to the general and unjust accusation made by employers against the Iron Molders' Union. Nor has the union itself been entirely free from mistakes of this kind in its history, for many of you will have a distinct recollection of a law adopted, against the advice of many of our best thinkers, by the London convention of 1886, which essayed to prescribe a limit of $3.50 per day upon the earnings of piece workers. It did not take long to demonstrate the impracticability of such legislation, and its unpopularity among the members in general, for the law not only remained a dead letter, but was repealed at the first opportunity. Some locals still attempt to perpetuate the policy of limiting earnings of piece workers, which after all is limitation of output by another name, but unless the limit is placed so high that a few or none can reach it, it is nothing but a source of trouble and fails of its purpose; and to my mind it has a distinct tendency to reduce prices. Compare the condition of locals that have no limit, and they are in the vast majority, with those that have, and draw your own conclusions.

In the foundries where day-work prevails, occasional friction has arisen over the amount of a day's work and attempts to increase it, and some times our members have not displayed the best of judgment in handling it, but, as a rule, the difficulty yields to common sense treatment if both employer and molders are actuated by a spirit of fairness. It should be

our purpose, at all times, to give a fair day's work for a fair day's pay, and in deciding what is fair in each case we must allow neither prejudice nor precedent to control our judgment and sense of equity.

COMPLETE ABOLITION OF PIECE WORK IMPRACTICAL.

In accordance with the instructions of the Indianapolis convention, a vote of the membership was asked upon the proposition to abolish piece work in the foundry. This we recognized to be a very important issue and contemplated a most radical change from the time-honored system prevailing in several branches of our trade. Every effort was made to stimulate intelligent discussion in the *Journal*, but, I regret to say, our membership both in this and the subsequent vote, displayed an apathy inconsistent with the gravity of the question. The vote, though a small one, was very decisively in favor of the abolition of piece work, standing 12,449 in favor and 1,048 opposed.

In accordance with this expression, the subject was brought up for discussion at the conference with S. F. N. D. A. representatives in March, 1900. The proposition that stove molding be placed upon a day-work basis was vigorously opposed by the conferees of the association and as vigorously urged by the union's representatives. Beyond demonstrating that the day-work proposition would meet with the strenuous opposition of stove manufacturers, conference adjourned without much progress being made. Since that time no further attempt has been made to push the change in the stove plate foundries. As applied to those branches of the trade wherein the piece-price system would be inequitable and unfair to the molder, the National union has always consistently opposed its introduction or sought to eradicate it. I am convinced, however, that in those subdivisions of the trade wherein the piece-price system has been for many years the established and accepted custom, a change so revolutionary as the transition to a day-work basis would be, will not only prove most difficult of accomplishment, but will develop most objectionable features and prove a disappointment to many who are now earnest in its advocacy. For these reasons I believe the interests of our members employed upon those classes of work which almost from the inception of the industry have been upon a piece-price basis, will be best conserved by efforts to regulate prices and conditions, rather than by any efforts we might make to abolish the system. As applied to the machinery or jobbing interests, I am unequivocally opposed to the introduction of piece work and in accord with all practical efforts to abolish it wherever it may exist.

CAST IRON NOTES.

Devoted to inquiries from Practical Foundrymen on the subject of Melting and Using Cast Iron. Address all inquiries to W. J. KEEP, care of The Foundry.

Lime for a Cupola Flux.

Question.—In putting limestone in a cupola to flux the slag, will the hard barrel lime that is already burnt answer the purpose of limestone? There is no limestone in this part of the country.

Answer.—The lime you speak of will answer as well if you can get it to the melting point. In using limestone you waste heat in burning it to lime. It must be calcined before it will unite with the silica and alumina to form slag. You will probably get the best results by making a whitewash, with water, about as thick as cream. If you can purchase a cheap impure salt add enough to make a whitewash that would not rub off if used to whiten a wall. Throw enough of this on each charge of coke to make 10 pounds of lime to each ton of iron charged. After a trial you can increase or decrease as you choose. In this way the lime runs into the cells of the coke and dries into a solid coat and will not blow out as it would if charged in the form of a powder. The water does no harm as it evaporates before the coke reaches the melting point; in fact, the coke probably reaches the point where it burns in better shape than when charged dry. The question has never been settled whether wet or dry coke is most economical, but the evidence is rather in favor of wet coke.

A Question of Shrinkage.

Question.—We make quite a number of castings which are round in form, 0¼ inches in diameter on the outside, with a 5-inch core through them; on one side there are a number of holes cored for tubes to fit into. Out of the same ladle we poured ½-inch square test bars and two of these castings. The shrinkage of the test bar was .162 inches per foot, while the shrinkage of the cored casting was only .040 per foot. How are we to determine a standard shrinkage of a ½-inch test bar that will show that our castings have the desired shrinkage?

There seems to us to be a very great differ-

ence in shrinkage between these two different castings. Have you any explanation to offer?

Answer.—The measured shrinkage of the ½-inch square test bar is absolutelv correct. I have doubts as to the correctness of the measured shrinkage of the casting. The only accurate way to measure the shrinkage of any casting is by a yoke. You could temporarily fix two lugs on the pattern 12⅛ inches apart and bed one of the yokes in the sand that you use with your ½-inch bars. If you arrange to locate the yoke on the casting exactly as it lay in the sand you can measure the shrinkage per foot. In making so large a casting the molder is likely to rap his pattern or to increase the length of the mold and a core sometimes impedes shrinkage.

The shrinkage of any casting depends upon its chemical analysis and upon its rate of cooling.

The composition of test bar and casting are the same, therefore any actual difference in shrinkage is on account of the different rates of cooling.

The rate is determined by dividing the cubic inches of contents of the casting by the square inches of cooling surface. The cubic contents of an inch in length of a ½-inch bar is .25 inch, which divided by 2 square inches of cooling surface equals a cooling ratio of .12. The casting was ½-inch thick and 6 inches in diameter. One inch in length would have 8.64 cubic inches. The outside surface would be nearly 19 inches. 8.64÷19=.45 ratio.

With iron that shrinks .162 inch in a ½-inch test bar the ratio .45 would give .108 shrinkage (*Cast Iron*, page 156). But the core would have acted as a cooling surface, though on account of its being dry and from its being surrounded by the casting the core would not have abstracted heat as rapidly as the outside green sand. Say it cooled half as much, then the cooling surface would have been 28 inches. 8.64 divided by 28 equals ratio .31, which would give .125 inch per foot.

The only way, however, is to measure the shrinkage with a yoke. One word regarding standard shrinkage for a shop. If you measure the shrinkage of a ½-inch square test bar from the same iron that makes a satisfactory casting, that shrinkage is your standard. For example, if the casting we have been considering is satisfactory then .162 inch shrinkage is a standard. If any day you find the shrinkage .170, increase the silicon until it comes back to .160. If the shrinkage goes below that you must look out for spongy and too open grained castings. While you can calculate the shrinkage of any size of casting if you can calculate the ratio of cooling by the graphic chart referred to, you will have to measure the shrinkage of some special castings.

Molding Machines for Large Castings.

At a recent meeting of the Philadelphia Foundrymen's Association, Mr. E. H. Mumford, of the Tabor Mfg. Co., Philadelphia, stated that while the latter had built some very large power ramming molding machines for general use, and had still larger ones in prospect, the idea that machines were at once to be built for the largest class of castings was somewhat erroneous. He called attention to the fact that molding machines differed very much in the work which they do, since some only rammed the mold while others only drew the pattern, yet other machines performed both operations.

Mr. Mumford cited some instances where molding machines have been built for turning out castings weighing as much as 1,000 pounds. Deep pockets had to be more or less rammed by hand but the larger part of the mold is rammed by the machine itself. The speaker thought that the method of ramming a mold by a quick blow, as is done by the Tabor machine, had advantages over a slow pressure. Wooden stripping plates are used with some of these machines, and in some instances these are clamped to the flask and lifted from the machine, together with the mold, thus doing away with the necessity for bars in the flask, as the stripping plate prevents the sand from falling out until the mold is turned over, when it may be removed and returned to the machine ready for the next mold. Mr. Mumford laid stress on the fact that molding machines could not ram narrow spaces or deep pockets in patterns as would be the case if the sand could be treated like a fluid, which cannot be done since it moves very little out of the direct line of pressure, and its friction on itself and its surroundings is very great. The Tabor Mfg. Co. is now engaged in building machines which will handle a flask 28x70 inches, producing castings weighing from 900 to 1,200 pounds each. These machines will ram the molds and also draw the pattern.

Enz & Orr are enlarging their foundry at Denver, Colo., to nearly double its present capacity.

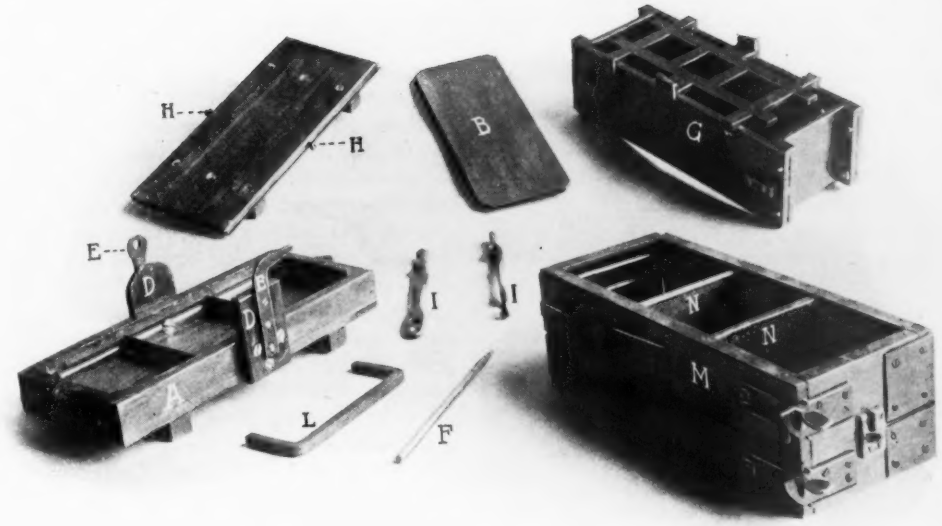


FIG. 1.—BURKE'S METHOD OF USING LARGE SNAP MOLDS.

Snap Flasks for Large Molds.

There is a limit beyond which the ordinary snap flask can not pass and compete in quality of castings with those turned out in regular floor flasks. Many attempts have been made to increase the sphere of the snap flask through using temporary bars, jackets, etc., and even resorting to a solid built drag to be used in conjunction with a snap cope. Mr. P. Burke, of Rochester, N. Y., has designed a special snap flask which to say the least, possesses some points of novelty, and we are advised that these flasks have been used for molding radiators and like castings generally made in permanent floor flasks. Fig. 1 shows the complete outfit, the illustrations being made from a set of models. A is what is called a combination follow board, which in the form it is

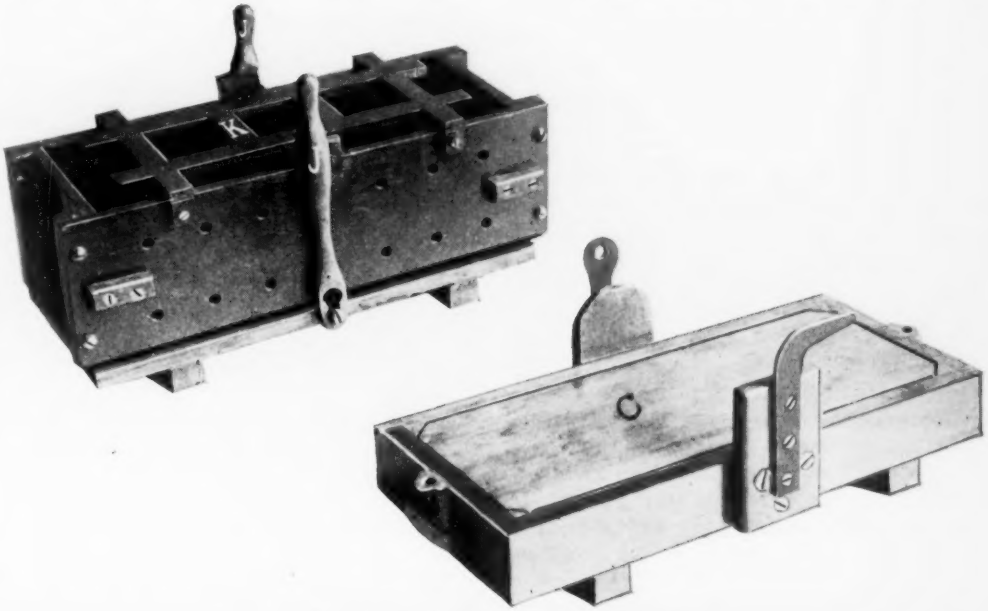


FIG. 2.—BURKE'S SYSTEM OF SNAP MOLDING.

there shown, is suited to carry a sand match for the pattern. Should it be desired to use this for a split pattern or in connection with a matchplate the smooth board B is fastened to the follow board when this assumes the form shown in C, Fig. 2. The guides, D D are intended to prevent the spreading of the drag while being rammed up, and also carry the clamping irons, E E, which are used in connection with the clamping bar, F, to hold bot-

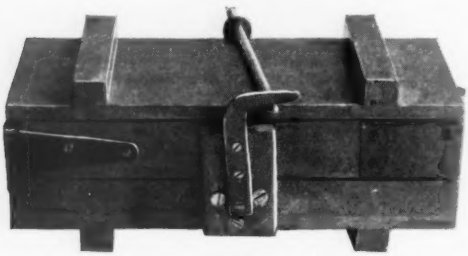


FIG. 3. THE DRAG READY TO ROLL OVER.

tom board and drag in proper place while being rolled over as shown in Fig. 3. One of the clamping irons has a tapered extension which allows for any slight difference in the thickness of bottom boards or the amount of sand placed underneath same to make it rest solid on the mold to be taken up. One end of the clamping bar is also tapered which permits of further adjustment.

The binder G may be made of steel or cast iron, and need not be made very heavy to do the work required of it. When made of cast iron five sections are required, two sides, two ends and one top piece, the latter being used for large molds, where the pressure of iron is greater than the sand itself will withstand. The flat bars of same may be so arranged as to take care of any chaplets which require securing. The end pieces of the binder should have chipping pieces cast on to permit of easy fitting up. It is understood, of course, that this binder takes the place of an ordinary jacket and is shifted from mold to mold in usual way. It should be made half an inch or so less in depth than the mold to allow for any loose sand which may be cut from the latter in putting on the binder. Wood handles are also recommended instead of iron ones where continuous use is likely to heat these.

In using this system of snap molding the bottom boards are provided with projections H H which engage with the binder clamps I I as shown in Fig. 2. The wedges cast on the side plates should be low enough to permit of the insertion of a small piece of wood under the head of the clamps, J J, as this will hold more securely than if iron is resting against iron. The upper illustration in Fig. 2 shows the appearance of the finished mold clamped up and ready to be cast. It will be noted that the binder takes the place of iron or wood flasks and the weights which are employed in snap molding.

The cross bar lock of K is only required to be used for large molds or heavy castings; in the ramming up of the cope for same, the clamp L may be used to guarantee greater rigidity, as shown in Fig. 4. The flask M is provided with cross bars N N where necessary and when thus supplied may be rolled over for drawing patterns or being finished the same as a mold made in floor flasks.

These cross bars lock themselves in place automatically and are so made that a clearance exists between them and the top and sides of the mold so that there is no chance of disturbing them when the binder is being placed on the mold, it being understood that these bars remain permanently in the mold until cast and that a supply of these must be provided depending upon the number of molds to be put up at one heat. Unless very large flasks are used the clamp applied as shown in Fig. 4 will keep the flask firm until it is closed and cross bars are not needed.

Naturally a snap flask for large molds should be strongly made and reinforced by corner irons and bound by straps of iron wherever it is subjected to wear and tear. The

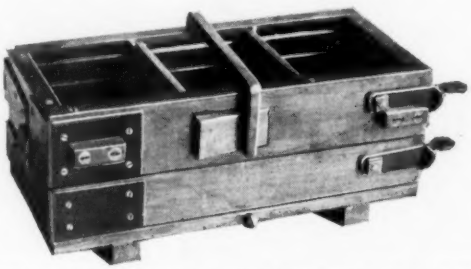


FIG. 4. GUARDING AGAINST SPRINGING OF LARGE SNAP MOLDS.

hinges should be of large size and the fittings throughout be made as strong and solid as possible. With an occasional varnishing of its interior a snap flask thus made will last a surprisingly long time. Wherever they can be put to practical use, they do away with the cost of iron or wood flasks and the expense attached to the renewal of same. The number of binders each molder will require will be the

same as the number of molds he can pour with a ladle of iron. Foundries making their own snap flasks will find it advantageous to make a block the size of the mold they intend to make and then fitting flask and binders to this, as this method will insure greater uniformity. Under all circumstances bottom boards to be used for large sized snap molds should be made very strongly as if a weak board does not rest evenly on the molding floor it offers an opportunity for the mold to spring and crack, resulting in imperfect castings, which can be avoided by using better bottom boards. It is said that molders who have been changed from jobs made in solid flasks to the system of snap molding here described, have shown a decided preference for the latter.

The Farwell Automatic Molding Machine.

The millions of small castings consumed in this country annually offered the foundryman the first chance to accomplish by mechanical means what had before been left to hand labor alone. The first molding machines date back many years and were rather crude affairs compared with the machines being built at the present time. It is interesting to note that while the field for the molding machine is constantly widening and larger castings coming within its sphere, improvements are continually being made in the molding of the lighter class of castings. With this we show some illustrations of the Farwell automatic molding machine, which is designed to make a complete mold. Through different movements it will separate the flask and insert the pattern plate, peen and ram drag and cope of the mold, clamp on bottom board and turn over the drag, cut sprue holes or draw flat gates, separate the mold, draw the pattern, close the mold and remove the flask from the mold, leaving it ready to be placed upon the floor.

For doing the ramming of the mold the Farwell automatic molding machine has a turret top provided with a peening frame for the drag, a peening frame for the cope and a presser head, each of which is alternately brought into the proper position. A solid tapered flask is employed having retaining ribs in the cope section to prevent the sand from falling out when this is lifted off; these rock back at the proper time and allow the mold to slip out of the flask. The match plate is mounted upon a pattern frame provided with trunnions and through a simple carrier mechanism is passed to the rear of the machine when not in use. Care has been taken to have the principal working parts protected through sand proof bearings.

In Fig. 1 the flask has been separated and

FIG. 1.—PEENING THE DRAG.

the pattern frame inserted between the cope and drag, the latter has been filled with sand and the operator is shown in the act of using the peening frame supplied for same. After he has peened the drag he strikes the sand off

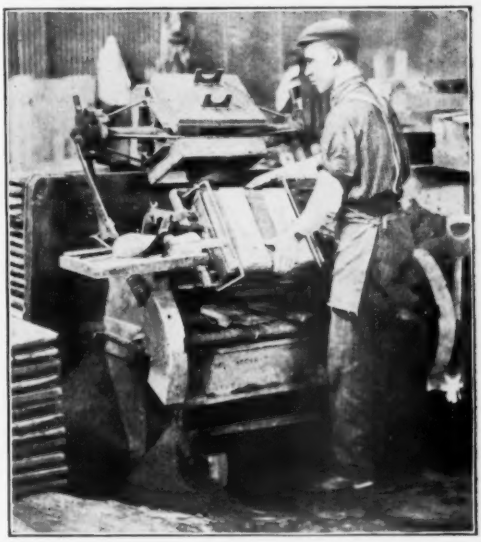


FIG. 2.—ROLLING OVER THE MOLD AFTER PEENING THE DRAG.

level and places the bottom board thereon, at the same time bringing the two clamps into position and turning the whole thing over as shown in Fig. 2. He now fills the cope with sand, brings the peening frame for this part of

the mold into play, removes the surplus sand and swings the presser board on the turret top into place automatically. At this point of the operation we have the cope and the drag both filled with sand and peened, but neither one has been rammed. This the operator now proceeds to do through a suitable lever, the presser board on the turret top ramming the cope while the bottom board is forced into the drag from below, thus ramming both cope and drag at one operation.

In Fig. 3 the molder is raising the presser board just after he has rammed the mold. In the casting here being molded flat gates are required which the molder places in the usual

FIG. 3. RAISING THE PRESSER BOARD AFTER RAMMING THE MOLD.

way; during the ramming of the mold these engage with springs in the presser board and are drawn together with the latter and there retained until their use is required in the next mold. On patterns where only the ordinary round sprue is needed, sprue cutters may be attached direct to the presser board, when the gating is done automatically. Through the raising of a lever the cope and drag are at the same instant lifted away from the pattern frame, leaving the mold as seen in Fig. 4, which shows the molder as he is about to pass the pattern frame from between the cope and drag of the mold to the rear of the machine, where it remains until he is ready to start a new mold. After removing the pattern the operator by a simple movement of the lever brings the cope and drag together and releasing the ribs holding the sand in the cope, which at the same

FIG. 4. PASSING THE PATTERN FRAME TO REAR OF MACHINE.

time locks the two parts of the flask together, allows the finished mold to slide out of the flask as shown in Fig. 5.

As a matter of general interest it may be said that the machine shown in these illustrations has been in successful service in the foundry of the Adams Co., builders of the Farwell molding machines, Dubuque, Iowa, for nearly nine years and during that time has produced over 700,000 castings, weighing about 8 pounds each. This is at the rate of a ton of finished castings for each working day during this period and the makers say that the ma-

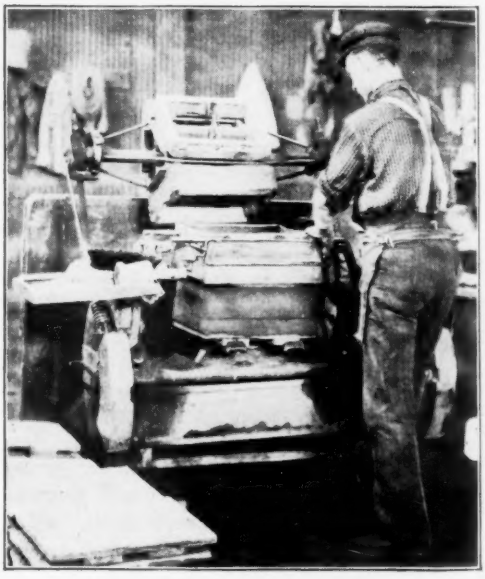


FIG. 5. REMOVING FLASK FROM MOLD.

chine shows little deterioration and will likely maintain this record of production for years to come. About twice as many molds are being turned out by it as could be done by the same men by hand, besides minimizing the skill required by the operator. In Fig. 6 is shown a pattern plate attached to the pattern frame used on the Farwell automatic molding machine.

In describing a few methods which have been

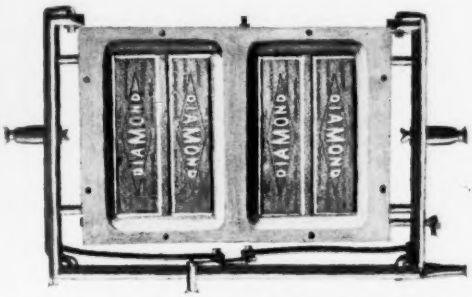


FIG. 6. PATTERN FRAME FOR THE FARWELL AUTOMATIC MOLDING MACHINE.

successfully employed in making match plates and in putting patterns on plates, the Adams Co. say that while they claim nothing new for these, it seems to be a common impression that the use of match plates is practically limited to patterns having straight parting lines. On the contrary, match plates show their superiority over carded patterns to a greater degree when the parting lines around the patterns are irregular, with deep vertical sand to sand partings. In molds having such partings, great care in distributing the parting sand is necessary to insure a good "lift." With match plates there can be no sand to sand partings and a good lift is assured. Match plates are also superior to carded patterns when the patterns are slender and would spring on a card, or when they require delicate gates that are liable to break off a card.

One method followed by the Adams Co. in fitting up match plates is applicable to patterns where from one to eight of these would be required to fill a flask and covers patterns that would be difficult to split and place on a plate, including agricultural, stove and general machinery castings of the lighter class. As an example of such patterns take four stove legs, castings which are familiar in form to all and are very irregular in shape, the parting line at F, Fig. 7, extending far above the joint of the flask. To built up four wooden patterns upon one side of a board and hollow out the opposite side to give the proper shape and thickness to the casting would tax the skill of some of the best pattern makers. To fit these legs on a plate, two right side up, and the others the reverse side up, so that both cope and drag could be rammed up on the same side of the plate and have the parting exactly match when the flask is reversed and closed, (as is done with stripping plate machines) would be a little job of pattern work that would be considered quite a trick even by those most skilled in this class of work. Therefore these stove legs would, in the majority of cases, be put down by the foundryman as among the many jobs that cannot be successfully mounted on a match plate. For the benefit of those who have had no experience in handling patterns of this kind in connection with molding machines, the following method of procuring a pattern plate is described:

First, if the design of the stove leg is new, a master pattern must be made by carving it out of wood, building up out of metal, modeling in wax or clay, or some of the many ways of making such master patterns, as would be the case no matter how the permanent patterns were to be constructed. This first pattern should be two shrinkages larger than the permanent pattern is to be. Cast from this first

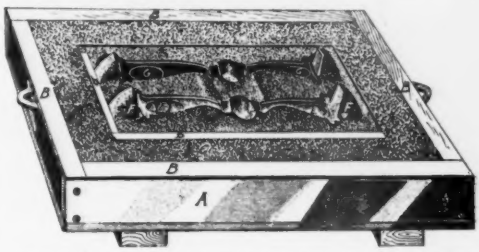


FIG. 7. METHOD OF MAKING MATCH PLATES FOR PATTERNS WITH IRREGULAR PARTING LINES.

pattern four good castings in soft metal and finish them sufficiently to have them draw well. If care is exercised in molding them in fine sand but little time will be required to finish them good enough for the use intended of them.

Next take a first class floor flask of a size not less than 6 inches each way larger than the extreme outside of the plate (which is the same size as the outside of the flask in which the legs are to be made), and see to it that this flask is a good sound one with a true joint, strong bars and well fitted pins. Pins that fit well, not only when the flask is closed, but that fit well when the joint between the

cope and drag is separated ½ inch or more. It is well to make a flask to be used for this class of work of a size large enough to make the largest plates required, say 30x36 inches inside with 4-inch drag and 6-inch cope and keep it for this purpose alone. Have some strips dressed to even thickness (the thickness desired to make the plate, say ¼ inch), to make a frame (see D, Fig. 7) the outside size, the size the plate is to be made plus the shrinkage. Also cut four other strips B B of the same thickness to tack on the joint of the flask at the proper time.

Now have a careful molder mold the four legs from the soft metal patterns, placing them in the center of the large floor flask in the exact position in relation to each other that they would be if molded in a proper size flask. This mold should be made in the ordinary manner except with greater care and the gates are placed nearer the edge of the flask, or outside the space the frame D will occupy. The parting should be sleeked smooth and be exactly the right height around the patterns while it should be brought to a level with the joint of the flask as near the patterns as practicable. Too much care cannot be exerted in getting the parting just right before the cope is rammed, for the success of the job depends upon this. In ramming the cope care should be taken not to ram the parting down, as this would spoil the mold. A perfect lift is necessary and it is better to dump out the mold and try again, rather than to attempt to patch a mold from which a good pattern plate is expected to be cast. Now that the mold is separated, and the patterns drawn, the strips D D D D, before described, are laid upon the mold in the position shown in Fig. 7 (although in the cut two of the strips have been drawn), and the other strips B B tacked on the joint of the flask. The space between these two frames is then filled with sand and sleeked off level with the top of the frames. Draw out the inner frame D, but not the outer frame B, and cut the proper gates or runners. Close, clamp and pour the mold with brass, iron, or other metal, in the usual way. Finish this casting carefully and you will have the most durable and best working pattern in the foundry and it has cost no more than a well-gated and hard-matched pattern.

The operation may be varied somewhat by making a wood or plaster follow board for the patterns which of course will save the molder the trouble of making the parting, or if a single pattern is to be made, the plate may be molded direct from the original wood pattern, instead of making the additional soft metal patterns, which are made simply that we may get duplicates from which to work. If you have a card of patterns with a good match or follow board that you wish to put on a plate (and if they will allow of another shrinkage), just add to the outside of the match frame enough width to cover the larger flask and proceed as before.

It will be noticed that the whole operation of putting patterns of this character on a plate, no matter how irregular the parting line may be, is simply to make a mold in a larger flask and then to separate the joint between the two parts of the mold the thickness the plate is required. The reverse side of the impression in the cope part of the mold will be on one side of the plate, while that in the drag will be on the other side of the plate. As to the gate, it may either be made separately and secured to the finished pattern, or it may be made in wood and placed in position between the patterns when the mold is made or it may be carefully cut in the mold with a gate cutter.

A class of patterns that the foregoing could not be applied to would include small patterns with irregular parting around the edge of the pattern or with pockets that would have deep sand to sand partings if carded, such as light builders' hardware, saddlery hardware, and ornamented castings in iron or other metals. Let us, as an example, take the barrel bolt case shown in Fig. 8 and let us say that we desire to put 36 of these patterns on a plate

FIG. 8. BARREL BOLT AND CASE.

to run in a 12½x20-inch flask, and our method of securing this complete match plate would be as follows:

We must first obtain a master pattern in iron or cast brass with no soldered parts, two shrinkages larger than the castings are to be. Now take this master pattern and bed it in the drag of a suitable flask, and place upon this pattern a block, say ¼ inch each way larger than the pattern and ¼ inch thick. Ram a cope on this, separate and draw out of the cope the block of wood, but leave the master pattern

still bedded in the drag. Make a nice parting around the outer edge and in the holes, cut a gate in the cope, close, and pour with either aluminum or zinc right upon the master pattern. This will give us a half mold in metal. (See F in Fig. 9) After having nicely finished the parting of this metal piece, bed the pattern mold and all in the drag, the other side up, and form another half mold upon the master pattern and metal half mold. (See G, Fig. 9.) If zinc is used for making these molds, it is best to smoke the first mold made over a

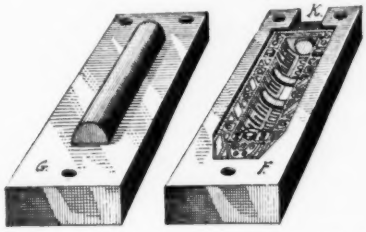


FIG. 9. MOLD FOR MAKING PATTERNS.

kerosene lamp before pouring the second half, or this is liable to fuse to the first. Drill holes through the margin of the mold so the two parts may be dowelled together like a core box as in Fig. 9. File a gate at K into which we are later to pour metal.

For match plates for this class of castings the Adams Co. usually employ polished steel saw blade plates, which they obtain, cut to size, ground and polished, from manufacturers of saws. The plate to be used for this purpose should be of a size equal to outside diameter of flask, and from 3-16 inch to ¼ inch thick. In this case the plate would be 14¼x 21¾x3-16 thick (figuring on a wooden flask of ⅞ inch material). Mark on this plate the position of the 36 patterns as shown in Fig. 10 in dotted lines, and drill and cut the oblong holes C and D, and bevel or countersink those holes on each side. Drill the holes to receive the dowel pins exactly the same distance apart that they are in the mold. Now, with a soldering iron, tin all around the holes D as far as the patterns will reach.

We are by this time ready to mold the pattern. Put the metal mold, one-half on each side of the plate, with the dowel pins through the holes to keep the two halves of the mold exactly opposite each other and fill the mold with white metal. If the metal flows well it will be found on removing the mold a bright, smooth pattern of the barrel bolt is upon the plate with convex part on one side and the concave on the other, and the openings H where the straight sand to sand parting would be in a carded pattern, has a smooth web of just the right thickness to insure a clean cut through when molded in sand. After pouring all the patterns in like manner and soldering in the runners of brass or other metal, we have a pattern plate with 36 well finished patterns all ready for the sand.

They are all alike, too, which is of great advantage in some cases. Of course the mode of procedure would be varied as the character of the pattern changes. If the parting around the outer edge of the pattern is irregular, that is, above and below the flask joint, the metal mold will have to be made sufficiently large to take in all the irregular parting.

If the pattern has a simple straight parting, it can be run on a plate in the same way by simply drilling a row of holes through which the metal will flow and connect the two parts of the pattern together, half on each side of the plate. Patterns of steam fittings and chunky work requiring cores are best molded in half shells and afterward secured to the plate. The metal mold can be made in the same way, but each half is used separate and a metal half core employed to shell the pattern out.

Nearly every pattern shop has a formula for

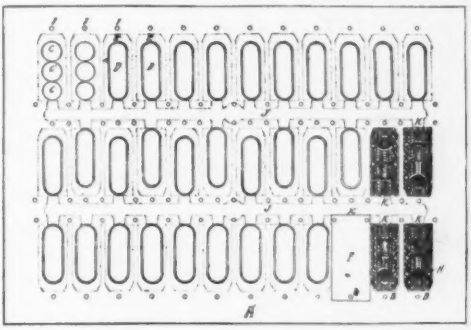


FIG. 10. METHOD OF MOUNTING PATTERNS ON MATCH PLATES.

white metal for patterns. The Adams Co., in their extensive experience in preparing patterns for machine molding, have tried many mixtures in making the metal molds described above, also in making the patterns. Where the nature of the work will permit, aluminum is a good metal from which to make the mold. Very hot metal may be poured into such a mold with no danger of its sticking, but if there are chunky places in the mold, there is liable to be trouble in making the mold of aluminum, because of its great tendency to

shrink holes. Zinc has been found to be very good. But it is usually necessary to thoroughly smoke the mold before pouring metal into it, because of the tendency of the melted metal fusing and sticking in the mold.

As a metal from which to make the permanent patterns, the Adams Co. have found common half and half solder (½ tin, ½ lead), to be good for small patterns. It is very soft and liable to be marred, but used in connection with match plates and their automatic molding machine, the Adams Co. have found that it is not liable to injury. Some type metals are good. Below are a few:

Lead.	Antimony.	Tin.
55	30	15
55	22.7	22.3
61.3	18.5	20.7

A white metal that has small shrinkage and is good for pattern plates is lead 90, antimony 10. A harder metal with small shrinkage and very good for pattern plates is zinc 66 per cent, tin 34 per cent. An amalgam, very convenient in stopping up holes that cannot be soldered easily, is made of the filings of the above alloy, and mercury kneaded in the hand into stiff dough, squeezing out all the mercury possible. Press this amalgam when first made into the cavity and allow to harden. When hard it may be scraped or filed like the metal itself.

The Krank's Korner.

Were it not for the fact that the Krank is allowed more liberty than the editor himself in these Korners, I wouldn't have anything to say just now, but since it is my privilege to take up anything which comes within three miles of being connected with the foundry business it is very hard for me to keep out of work and refrain from making some people mad each publication day. My field as a Krank covers such a wide territory, and there are such a multitude of people in it with whom I like to argue, that it becomes a relatively easy matter to find a subject.

* * *

There is one theme upon which we can all talk and be original. This is the relative position of the employer and the employe. The reason every one of us lets out something new along this line every time we open our mouths is because no two of us hold the same views on this question. I am acquainted with many men in the trade who can rattle off page after page of stuff on the labor question when it is impossible for them to write a description of the method they follow in mixing claywash.

* * *

My friend Gilmour, of Milwaukee, prepared a message on "The Relative Position of the Employer and Employe" for the Philadelphia Foundrymen's Association. No one knows what this position is because it has not yet been fixed. Anyway, Mr. Gilmour pounded away at it just as if he was laying bricks on a loam job. He sprinkled this essay of his with quotations from the Apostle St. Paul and a political economist called Adam Smith, put a four cent stamp on it, and started it upon its journey to the Quaker City.

And those Philadelphia foundrymen, what did they do with Brother Gilmour's document? Read it by title the papers say, but then those Eastern sandpounders haven't been trained to appreciate the beautiful things we can say about the foundry business out West without having a run-out and burning anyone's feet. What is worse, they alluded to Mr. Gilmour's effort as a paper. Anyone can write a paper. It was no paper that Gilmour sent into the unexplored region of Eastern Pennsylvania. It was what Elbert Hubbard, the Philistine, would call a preachment, with a border of love vibrations thrown in to make the thing hang right.

The lesson is plain. Theology and the foundry business don't mix east of the Alleghenies. There is no affinity between the two. Probably there is no reason why such a condition should exist.

* * *

We all know that an article to sell well must have "talking points." The buying public must be made to understand that it possesses qualities peculiar to itself. If it is only as good as something else it will have to sell at a lower price.

The stove manufacturers of the United States have always been liberal advertisers, and the arguments they have advanced in favor of their product would fill a large book. Now comes the Cole Mfg. Co., of Chicago, with a stove in which the fire box linings and other parts subjected to intense heat are claimed to be made from a newly invented metal, called "Coleized Steel." According to reports this consists of a special mixture prepared from a secret formula, perfected by E. C. Cole, president of the company, and has been subjected to a series of tests in comparison with castings

made of gray and malleable iron, which showed some remarkable results.

Questions have often been asked in the columns of THE FOUNDRY in regard to the mixture which will produce the best grate bars and other castings having to withstand abnormal temperatures, and experiments made along this line have demonstrated that a soft iron, or a mixture above the average in silicon, will produce better castings for this purpose than the low grades of iron, or mixtures deficient in silicon, commonly employed. This is explained upon the theory that the expansion and contraction of a soft gray iron are less under the same variations in temperature than is the case with the harder grades of iron. In the reports we have at hand of the experiments conducted by Mr. Cole, he is said to have ascertained that if a malleable casting is made of the same weight as a gray iron casting, the heat resistance of the former is considerably greater. A gray iron casting in the form of a grate bar, after having been subjected nine days to a furnace test, was found to have retained not over one-third of its sectional area as a solid casting, whereas the same casting made from Coleized steel when subjected to the same test was found in perfect condition and of such strength that it could hardly be broken when hammered on an anvil. A gray iron casting, heated slightly beyond red heat, was easily shattered when struck on the anvil, while the Coleized steel acts more like wrought iron when subjected to such a test, being very tough. The Coleized steel is said to have four times greater heat resistance than standard gray iron castings and two times greater heat resistance than malleable iron.

Experiments of this kind are interesting if practical results are obtained. As far as the secret formula goes, if these "Coleized" castings show any special quality, there is but little probability that the "secret" will be kept very long, for with the aid of a few drillings from one of these castings a chemist will undoubtedly be able to reveal the secret to the trade at large.

AN ARKANSAW SHOP. FOUNDRY OF THE DILLEY FOUNDRY CO., PINE BLUFF, ARKANSAS.

* * *

In a former issue I reproduced a paragraph from an English journal telling what excellent practice prevailed at a certain foundry in that part of the world, where everything was carried on on a "scientific basis." Incidentally it was mentioned that castings were made in this shop up to five tons in weight and to this one of the readers of THE FOUNDRY in that neighborhood takes exception, writing me that they never made a casting weighing over 1,500 pounds and in order to get sixteen of these they were compelled to make twenty-four, and out of this bunch there was only one fit to look

at, the balance, although accepted, being covered with scabs. One of the molders working on the job suggested that a little seacoal might possibly improve affairs, but this was vetoed by the individual, supposed to be foreman, with the remark that if this should be done it would set the mold afire.

My correspondent continues: "The method of testing and grading iron and scrap in this 'scientific' foundry is to take a look at the fracture. I should like to know why this firm should have experienced any difficulty whatever in using Staffordshire iron, as numerous foundries in the vicinity, doing a similar class of work, are melting it right along without trouble. Possibly their own losses led them to believe that others were similarly afflicted. As for the 'modern' cupola mentioned one can scarcely turn around inside of it, so where is its melting capacity for 5-ton castings? I might also say that I have failed to find any of the labor-saving devices, which your article led one to believe were numerous."

All of which simply proves that a nice description of a plant does not by any means indicate that the plant is as nice as the description.

* * *

Although accidents in foundries are numerous enough, it is very seldom that they result fatally. Now and then a molder or helper is caught underneath a falling flask or core and more or less injured, yet when we consider the many mishaps at casting time, it is remarkable that so few are maimed. Doubtless this is because a mold generally gives some warning that there is something wrong in its interior before it heaves out the metal with which it has just been filled, and thus offers a chance for those in its immediate vicinity to escape. A few weeks ago a mold exploded at the Don foundry, John Fowler, proprietor, Sheffield, England, and five men were burned to death, besides a number seriously injured. Generally moisture is at the bottom of serious explosions of molds, but a subsequent investigation of the disaster at the Don foundry showed no evidence of dampness having been responsible for this. The casting was a roll, weighing 14 tons, and had a loam core, swept up on a core barrel in the usual way, throughout its center. The mold was cast vertically, and owing to the length of the core, this was divided into two parts, and about 600 pounds of weights placed on the core barrel where it projected through the mold, to guard against the pressure allowing the melted iron to find its way through the joint between the two cores. According to reports the weights on the core appear to have been balanced in a somewhat delicate position of equilibrium, and the expansion of the core barrel is supposed to have caused them to slip off their seat with the result that the core barrel was forced upward leaving the material of which the core was made in the mold, and as this contained a large quantity of carbonaceous matter an enormous quantity of gas was very suddenly generated with the result that the metal was forced out of the mold. It is presumed that this accident would not have occurred if the weights had been properly secured. We have nothing at hand showing the particular shape of the core, though it is possible that the weight placed thereon was insufficient.

* * *

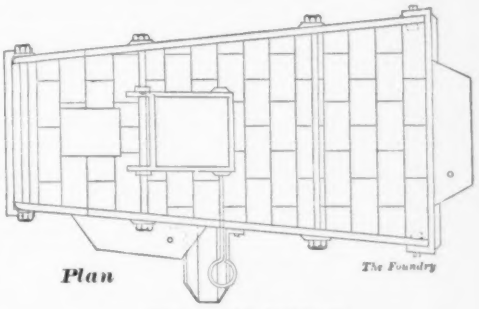
The premium system, of which a great deal has been written in connection with its introduction into machine shops, has so far caused but little excitement among the foundries, although there can be no reason why it should not work as well in that department as in any other, provided that its introduction is handled intelligently. Evidently something along this line is being attempted across the water, as we find the following in the *Journal of the Associated Iron-Molders of Scotland* for May:

"There is a desire for forcing upon workmen what is known as a premium system, which, as we understand it, means that any workman who may require, say nine hours, to produce or make a piece of work, is to be asked to do it if he can in seven hours, and he will receive an hour's pay as bonus, *i. e.*, paid for eight hours; or if a workman takes forty hours to complete a job, if he can do it in thirty-five or less hours he gets the one-half as a bonus. This mode of working would apply to time workers. The foreman and manager will consult over any pattern and consider how many hours this should be cast in, and also the time noted when it is taken out of mold, and sand restored to a working condition ready for another job. The workman gets a card from the foreman when he gets his pattern. At the top of the card is the number of hours allotted to begin and fully complete that job. Should he take four or five hours longer he will be paid certainly, but an enquiry will be held and a satisfactory reason for such delay is expected. This system of work may do for some trades,

but in molding, unforseen obstacles, which cannot always be provided for, continually face the workman, and in our opinion should this plan become general the middling and poor workman will fare badly. It is said by the advocates for such a system that no honest employer will reduce a time once given for a job, should any workman make a good premium, but to our mind this premium system would be worse and more debasing than any other system we know of."

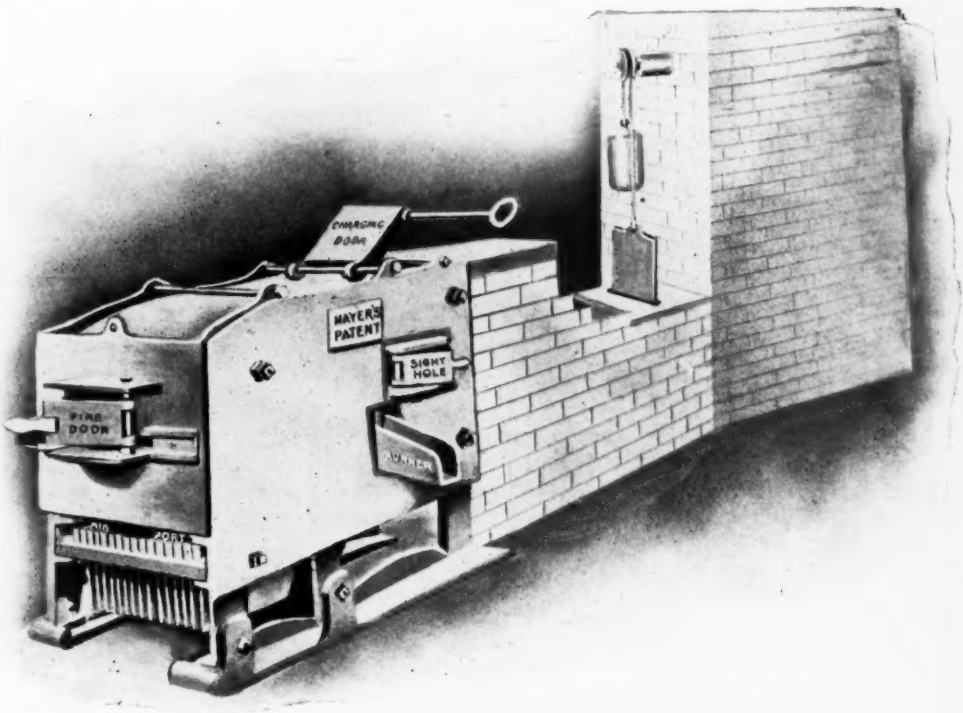
The Mayer Reverberatory Brass Melting Furnace.

From time to time we have illustrated in these columns a variety of brass melting furnaces, and it is but a few weeks ago that we described two of these in which the melting is done with oil as a fuel. For very heavy castings the ordinary cupola is sometimes employed in melting brass, though it is generally considered that the loss through oxidation



THE MAYER FURNACE.

dry, Dumbarton, Scotland, have been engaged in building the Mayer Brass Melting Air Furnace, so named after its inventor, and quite a number of these are today in use in British foundries. We show some sketches of what they term their standard furnace, which has a capacity of 3½ hundredweight per heat, and the method of connecting same to the chimney

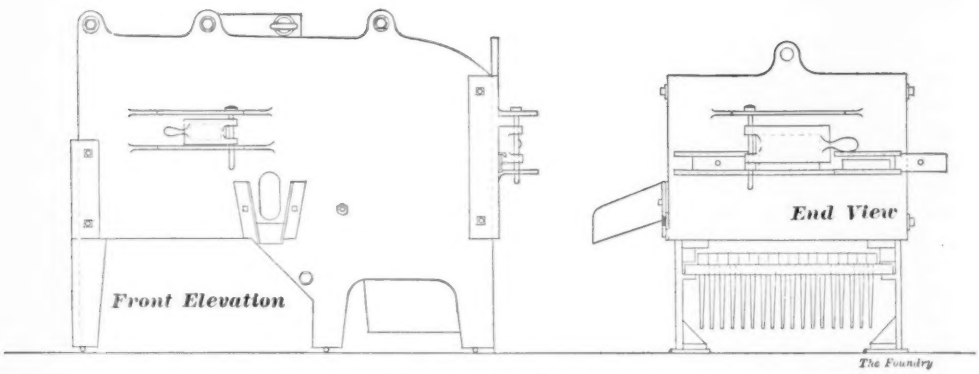


THE MAYER FURNACE.

makes this method of melting brass undesirable, besides the average brass foundry is not in a position to handle the metal as rapidly as this can be melted, even in a small cupola.

For the past two years Messrs. Hardie & Gordon, proprietors of the Levenbank Foun-

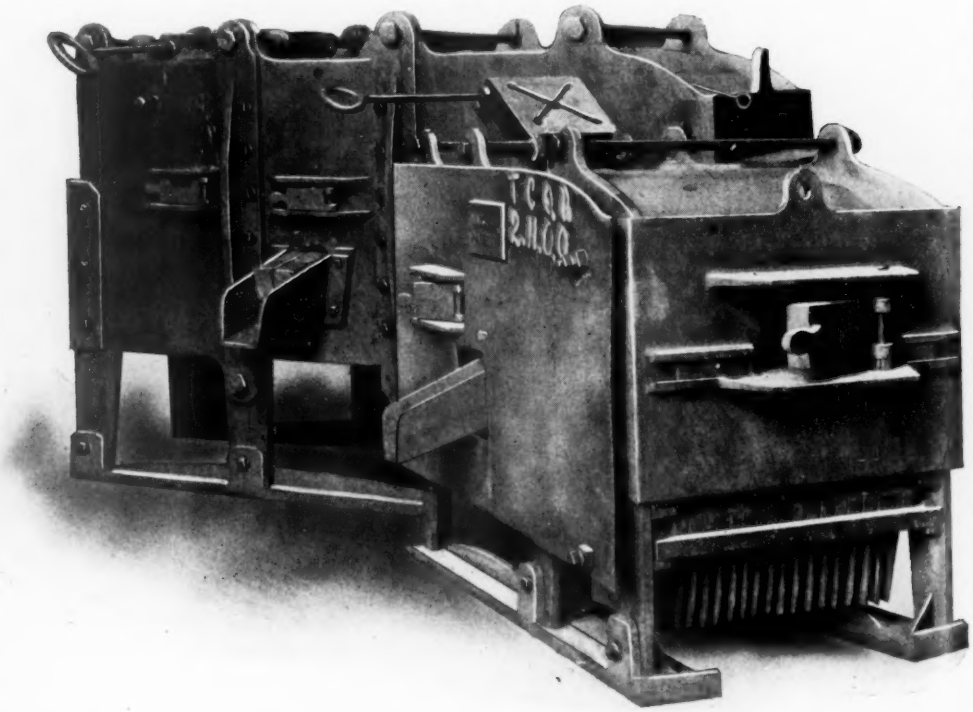
together with draft regulator. When operated to its full capacity six heats may be obtained in ten hours, and double that number if the charges are correspondingly reduced. These furnaces are made either right or left handed, and are operated and tapped as any ordinary



THE MAYER FURNACE.

reverberatory furnace; they are portable, the standard size weighing complete about 2½ tons. When lined with the best of fire brick they will stand six months' constant use without relining, and this time may be considerably extended if careful attention is paid to repairs. In order that users of these furnaces may obtain the best results through preserving the proper contour of the furnace Messrs. Hardie & Gordon supply a template of the internal part, to be used as a guide when relining becomes necessary. A set of firing and tapping tools is also furnished as part of the equipment.

The Mayer furnace has been built in capacities up to 20 hundredweight per heat, and the manufacturers state that they are prepared to exceed this if necessary. We have before us several reports from foundries employing these furnaces which show a consumption of coal per hundredweight of metal melted varying from 28 to 43 pounds, depending upon the



TWO MAYER FURNACES.

grade of coal used and the nature of the metal handled. The average loss with the Mayer Furnace when melting admiralty or gun metal has been 2 per cent; common brass 3 per cent; yellow brass 4 to 6 per cent, confirming previous experiments which show that the melting loss is always the heaviest and increases with the proportion of zinc in the mixture.

The following melting record from the works of John Kirkaldy, Ltd., London, England, shows a day's performance of the Mayer Furnace:

Lighted fire at 6:15 in furnace, having been banked night previous.

Heats.	Weight.			Charged.	Tapped.
	Cwts.	Qrs.	Lbs.		
1	1	1	10	A. M. 7.10	8.0
2	1	1	10	" 8.5	8.50
3	1	3	18	" 9.0	9.45
4	1	1	10	" 10.0	10.45
5	1	3	18	" 10.50	11.40
6	1	3	18	" 12.0	12.40
7	1	3	18	P. M. 12.50	1.35
8	1	3	18	" 1.40	2.30
9	1	3	18	" 2.40	3.30
10	3	2	8	" 3.40	5.10
11	1	1	10	" 5.15	5.55
12	0	3	16	" 6.5	6.55
Total Weight, 21	1		4 of Admiralty gun metal.		

NOTE.—Coal used during the whole day, including lighting up, 7 cwts. 0 qrs. 0 lbs. of mixed hard steam coal of fair quality. During the day the castings made varied from a few ounces to 300 pounds, and the metal was hot enough for all our work. The above results are satisfactory, and as there are no crucibles of metal to lift out of the furnace, the work of the furnacemen is much lighter than with the ordinary furnace. We worked the furnace all day in place of three pot furnaces, and tried several heats to ascertain the proportion of loss of metal in melting; it averaged with gun metal castings 2 per cent, these being made from rough clean scrap.

The makers of the Mayer furnace claim for it certain advantages, among which may be mentioned the absence of waste of brass in charging or tapping the furnace. As no metal can be lost in the ashes through the leakage or breakage of crucibles there is of course no necessity for the usual equipment employed in recovering waste metal. Taking it altogether this form of furnace construction for brass foundries is somewhat out of the usual course, and its progress will be watched with more than ordinary interest.

The Frankfort Brass Works have been incorporated at Frankfort, Ind., with a capital of $25,000.

Among the Foundries.

Quincy, Ill., which already possesses eight stove foundries, is soon to have another addition to the group. The new concern is now being organized and will be named the Star Stove Works. It will have a capital of $50,000. Interested parties are W. T. Dwire, L. Irwin, H. C. Baker and L. L. Nichols.

The Bellows Falls Machine Co., Bellows Falls, Vt., founders and machinists, have been reorganized with the following officers and directors: Frederick H. Babbitt, president; George H. Babbitt, vice-president; John E. Babbitt, treasurer and manager; Preston H. Hadley and George R. Wales.

The Union Iron Works is the name of a new company, organized in South McAlester, Ind. Ter., recently, with a capital of $25,000. Following are the directors of the company: D. R. Lewis, Tal Milwee, L. W. Bryan, Frank Smith, and J. H. Gordon.

The Reading Foundry Co., Reading, Pa., will shortly erect a new plant. Mr. P. D. Wanner, who for twenty years has been manager of the company, has retired from active work and is succeeded by Oliver S. Ticer.

The Gray-Blaisdell Co., of Bradford, Pa., builders of air and gas compressors, will add a foundry to their plant, 100x150 feet in size. It is to be equipped for handling the heavier class of castings.

The Youngstown Bronze Co. have been organized at Youngstown, Ohio, with a capital of $25,000.

Orrin H. Davison, now operating a foundry at 103 West Monroe St., Chicago., has purchased an idle plant at Maywood, Ill., which will be overhauled and started up as a branch foundry.

The Central City Brass & Mfg. Co., of Syracuse, N. Y., have had plans prepared for a new foundry 30x80 feet.

The Globe Iron Works, of San Francisco, Calif., will build a foundry 51x75 feet.

Harkins & Mahern, of Berlin, N. H., have extended their foundry so that it covers a space 60x80 feet.

M. A. Greene has reopened the foundry at Tallapoosa, Ga., which has been idle for several years.

The Carter Foundry Co., Niles, Mich., have under consideration the enlargement of their plant.

Chas. B. Warren, of the Alpena Iron Works, Alpena, Mich., has associated with himself, in the foundry business, Ed. C. Oliver, and the

firm name will hereafter be Warren & Oliver.

The Queen City Range Co., with a capital of $10,000, has been incorporated to manufacture stoves at East St. Louis, Ill., by H. A. Lengfelder, B. J. Taylor and J. W. Marsh.

The Richland Foundry Co., Belleville, Ill., are extending their foundry.

The Aetna Locomotive & Machine Co., with E. C. Hawkins as president, have been formed to build a large plant at Ballard, Wash.

The Ohio Malleable Iron Co., of Columbus, Ohio, have placed their new plant in operation. The officers are J. L. Rodgers, president and treasurer; F. K. Newman, vice-president and general manager; H. N. Smith, secretary; G. R. Kittle, assistant general manager. Mr. Newman for a number of years was superintendent of the Buckeye Malleable Iron & Coupler Co. of that city and Mr. Kittle also served this company in the same capacity for a long period. The Ohio Malleable Iron Co.'s plant will have about 75,000 square feet of floor space and for the protection of their customers' patterns a fire-proof pattern vault, separated from other buildings, has been provided. The main foundry building, already completed, is of brick and steel construction and is 260 feet long by 70 feet wide. The annealing building is 225 feet long by 65 feet wide. A complete trolley system forms part of the equipment.

The Elkhart Brass Co., of Elkhart, Ind., have been incorporated with a capital of $12,500 by Herbert E. Bucklen, William H. Anderson, Albert E. Hansen, Frederick A. Reed and Louis Anderson.

The Vulcan Malleable Iron Co. recently organized at Milwaukee, Wis., will begin the work of erecting the plant at Layton Park within the next few weeks. The company expects to be ready for business about Nov. 1.

The Roley foundry at Marysville, O., has been purchased by Edward Bowen.

Steiger & Kerr, of San Francisco, Cal., have awarded the contract for the erection of a new foundry.

Mr. Henry Stahl, of Manitowoc, Wis., has bought out the interest of Bernard Willman, in the Aluminum Foundry Co. of that city, and henceforth will be associated in the management of the corporation. The company have received so many orders that they are enlarging their plant.

Work has begun on the erection of the plant of the Minneapolis Steel & Machinery Co., Minneapolis, Minn. The plant will consist of a machine shop, foundry and structural shop. The cost of the erection of the buildings is nearly $100,000. The plant is to be placed in operation about October. The company was recently organized with a capital of $500,000 and will take over the business of the Twin City Iron Works.

The Delaware Marine Supply & Mfg. Co., Wilmington, Del., will erect a machine shop and foundry.

The Michigan Malleable Iron Co., Delray, Mich., will make further additions to their already large plant which it is expected will make them the largest single producer of malleable castings in the United States.

The Glauber Brass Mfg. Co., Cleveland, O., will increase their manufacturing capacity and install equipment to bring their plant to a high state of efficiency.

The Elkhart Steel Range & Foundry Co. have been organized at Elkhart, Ind., with a capital of $10,000.

The Hockensmith Wheel & Mine Car Co., of Irwin, Pa., have procured a site of 5½ acres a short distance from Greensburg, Pa., and expect to have their new plant at the latter point ready for occupation within a short time. The plans call for a foundry and machine shop 225x60 feet, blacksmith and wood shop 175x50 feet, pattern shop and storage 125x25 feet, two stories high, and in addition power house and office building, all of which are to be of steel construction. The necessary equipment will be electrically operated throughout. Hawley & Wharton, of Pittsburg, will superintend the erection of the plant. The Hockensmith Wheel & Mine Car Co. have a capital of $100,000, the officers being: F. C. Hockensmith, president; D. M. Wagoner, treasurer; F. L. Shallenberger, secretary, and Wilbur Hockensmith, engineer. The latter has until recently been connected with the Mesta Machine Co., of Homestead, Pa.

The Fort Wayne Steel Foundry Co. will soon be incorporated at Fort Wayne, Ind., with a capital of $200,000. It is expected that the new plant can be made ready for occupation early next year. Several of those interested in the new concern are also actively connected with the National Steel Casting Co., Montpelier, Ind.

John Rice & Bros. Co., Stevens Point, Wis., are enlarging their plant. A 15-ton open-hearth furnace for the manufacture of steel castings has been awarded E. E. Erickson, of Pittsburg.

The Cambridge Brass Foundry, Cambridge, Mass., have sold their stock and equipment and retired from business.

The Waldo Foundry, Bridgeport, Conn., have disposed of their stock and fixtures and are no longer engaged in the foundry business.

Fremont Turner is building a foundry at Des Moines, Iowa, and intends to engage in the manufacture of iron staircases, standpipes, tank frames and a general line of foundry work.

George P. Tilton has established a bronze foundry at Newburyport, Mass., and for the present will confine himself to the casting of bronze tablets. Later it is expected that a line of ornamental bronzes will be included.

The buildings to be erected at Barberton, O., for the Pittsburg Valve & Fittings Co., include an iron foundry 60x300 feet and a brass foundry 50x150 feet. Other departments for the finishing of the output of the foundries will also be erected.

The Tarrant Foundry Co., of Chicago, have discontinued the operation of their branch at Aurora, Ill., and will hereafter confine their manufacturing operations to the former point.

The Shaw Steel Casting Co., of Milwaukee, have changed their name to the Bay View Steel Casting Co., to avoid confusion with another company.

The Syracuse Malleable Iron Works, Syracuse, N. Y., will build a new foundry, about 100x200 feet, to be operated in connection with their present plant.

In consequence of the coal famine the Andrew Terry Co., Terryville, Conn., have been obliged to adopt fuel oil to operate their annealing department, and are now fitting up several of their furnaces with a system of oil burners. This is not a new departure with this company, as they were the pioneer malleable iron producers to successfully use oil for annealing. The company adopted the Aerated Fuel Co.'s system 12 years ago, but discontinued it in 1895, when the entire plant was burned and the apparatus for burning oil was ruined. Since that time hard coal has been used exclusively.

The Coxey Steel Casting Co. and the Coxey Silica Sand Co., Mt. Vernon, O., have been consolidated under the name of the Coxey Steel & Silica Sand Co., with a capital of $500,000.

Gustav Sauler and Fred Steinberg intend to erect a foundry at Shawano, Wis.

E. J. Hickson, who purchased the plant of the National Metallic Bedstead Co., of Marion, Ind., will move the entire plant to Muncie. It will occupy the old Bell stove foundry, which Mr. Hickson purchased last December. The latter plant has been completely overhauled.

The Locomotive Machine Co. has been incorporated at Montreal, P. Q.

Harry Pounder is removing his foundry from Rich Hill, Mo., to Coalgate, Ind. Ter.

The Mexican Central Railway Co. are building new shops at Aguas Calientes, Mexico, which will include an iron and wheel foundry 60x150 feet and a brass foundry 60x60 feet.

The Aurora (Ill.) Foundry Co. have increased their capital stock to $40,000.

The Geneva (N. Y.) Alloy Co. have been organized with a capital of $40,000.

The McClary Mfg. Co., of London, Ont., will erect a foundry 200x230 feet.

The Ross-Meehan Foundry Co., of Chattanooga, Tenn., have sold their brake-shoe department to the American Brake Shoe & Foundry Co.

The Fort Worth Foundry & Machine Co., Fort Worth, Texas, have been incorporated with a capital of $30,000 by L. R. Rumsey, G. F. Speer and John W. Wray. The plant formerly operated by the Fort Worth Iron Works will be taken over.

The Western Foundry Co., of Chicago, have increased their capital stock to $100,000.

The United States Foundry & Sales Co. have been incorporated to do business at South Norwalk, Conn., by H. S. Gould, J. I. Billings and L. B. Dailey. The capital stock of the new concern is $150,000.

The Keystone Valve & Mfg. Co. will build a machine shop and foundry at 2625 Sarah street, Pittsburg, Pa.

The Doyle Air Burner Co. will establish a plant at Aurora, Ill. A foundry will be included.

The U. S. Brass & Mfg. Co., of Warren, O., have made an assignment for the benefit of their creditors.

Plans have been prepared for Thos. Devlin & Co., Philadelphia, covering their new foundry to be erected at Burlington, N. J.

The Columbia Supply Co., Columbia, S. C., recently organized, are fitting up a shop for general machine and engine repair work and intend to add a foundry to their plant. G. A. Guignard is president and C. Atkinson secretary and treasurer. Mr. Atkinson is also secretary and manager of the Columbia Machine & Iron Works.

A new foundry will be built by the National Water Tube Boiler Co. at Brunswick, N. J.

The F. S. Lovell Machine Works, of Fitchburg, Mass., have sold their foundry department to W. A. Kenney.

Perham, Stickney & Co., of Lowell, Mass., have discontinued the operation of their foundry department, located at Atherton. The Riverside Brass Foundry, also of Lowell, have retired from business.

A. J. Martin has purchased the foundry at Watkins, N. Y., formerly operated by E. S. Rumsey.

The Featherstone Foundry & Machine Co., of Chicago, will build a foundry at Omaha, Neb., which will principally be engaged in turning out castings for the Union Pacific Ry. Co.

Fires.

The plant of the Montreal Pipe Foundry Co. at Acadia Mines, N. S., burned July 7. Loss covered by insurance.

The Scranton (Pa.) Steam Pump Co. lost their pattern shop and foundries in a fire July 2. The damage estimated at $30,000 is covered by insurance. The destroyed portion will be rebuilt at once.

Pascal Amesse's foundry at Montreal, P. Q., was badly damaged in a fire July 5. Insured.

A fire in the foundry of the Connell Brass Co., Buffalo, N. Y., on July 1 did a damage of $1,500. The loss is partly covered through insurance.

The Scaife Foundry & Machine Co., of Pittsburg, Pa., suffered the loss of their foundry department June 29. The fire is estimated to have done a damage of $50,000.

Deaths.

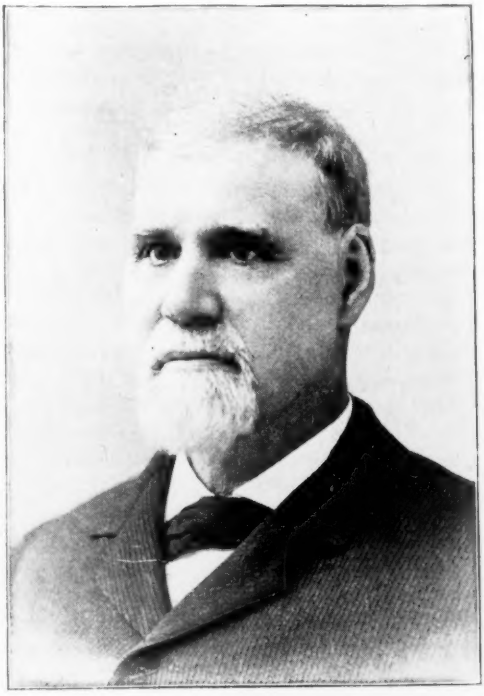
Adam Laytham, owner of the Eagle Iron & Brass Foundry, Passaic, N. J., died June 21, aged 61. Mr. Laytham had at different times been connected with a number of foundries in the vicinity. He was born in Manchester, England, and came from a family of iron founders, both his grandfather and his father having been proprietors of foundries. His sons will continue the Passaic business.

J. C. Adamson, of the Airdrie Iron Co., Airdrie, Scotland, expired suddenly June 24.

Stephen Fisher, of Stephen Fisher & Co., malleable iron founders, Sheffield, England, died June 26, aged 56.

John Bartlett, of Bartlett & Son, Bristol, England, died June 19, aged 78.

In the death of John Smith, Sr., at Detroit, Mich., the foundry trade of that vicinity loses one of its best known pioneers. He was born near Glasgow Dec. 31, 1826, and after serving an extensive apprenticeship came to America in 1854. After working in foundries at Detroit and Grand Rapids he returned to Scotland in 1857, but came back in 1861, taking charge of Kellogg's foundry, afterwards known as the Detroit Bridge & Iron Works. Here he remained until 1866, at which time the Detroit Dry Dock & Engine Works Co. was organized, when he became superintendent of the foundry of the new concern, a position he held consecutively for twenty-eight years, retiring in 1894. Mr. Smith was favorably known by the molders throughout the country, always



JOHN SMITH, SR.

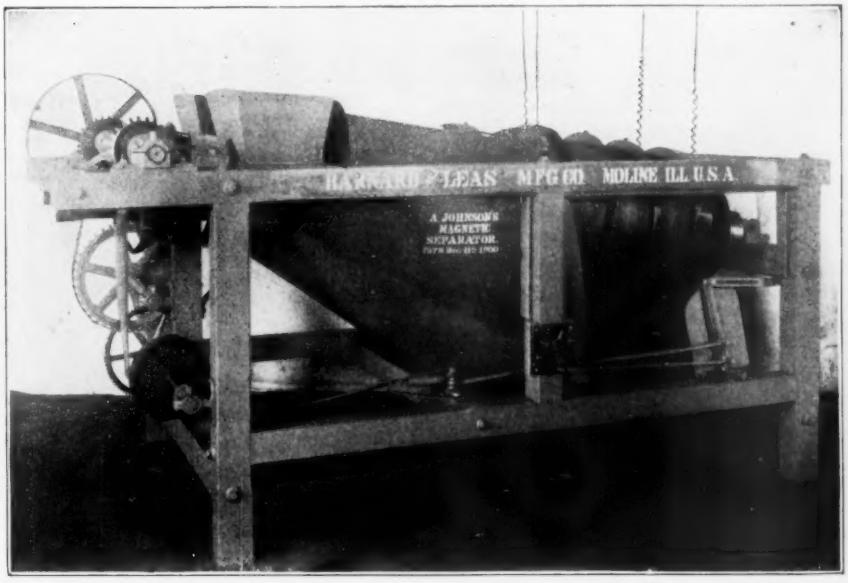
having taken an active interest in those with whom he came in immediate contact as well as in the welfare of the molders in general. A large number of successful foundrymen to be found all over the country served their apprenticeship with Mr. Smith. Among these are Mr. Jeremiah Dwyer, president of the Michigan Stove Works; deceased's elder son, Mr. John Smith, now in charge of the foundry of the Great Lakes Engineering Works; James Higgins, in charge of the Russel Wheel & Foundry Co., and Mr. Robert Smith, a nephew, who succeeded his uncle as foreman of the

foundry of the Detroit Dry Dock & Engine Works.

Albert E. Shorthill, president of the company bearing his name, of Marshalltown, Iowa, died July 6, aged 53.

Double Magnetic Separator.

The Barnard & Leas Mfg. Co., of Moline, Ill., have recently placed on the market a Magnetic Separator, for use in large foundries where the amount of work exceeds the capacity of their single machines, having two hoppers and two cylinders, thus giving the new machine double capacity. It has the same construction and is operated in the same manner as the single machine. The manufacturers say that their experience in their own foundry, corroborated by the managers of other shops where castings are made, has conclusively shown that all founders, who are making no effort to recover their waste iron, are throwing away enough metal to pay for a machine of this kind in a relatively short time.



BARNARD & LEAS MFG. CO.'S DOUBLE MAGNETIC SEPARATOR.

The Barnard & Leas Magnetic Separators while entirely automatic are very simple and substantial in construction. The wearing parts are few and are made especially strong. In operation the cinders and other refuse containing iron are crushed as is usual in a tumbling barrel, which has openings through which the crushed cinders and smaller pieces of iron pass, while the larger pieces are retained. These larger pieces of iron are cared for in the usual manner, and the crushed cinders and dust are then passed through the separator by being thrown or conveyed into the hopper on the machine. A screw conveyor in the bottom of the hopper then carries the waste by regular and steady flow into the revolving screen at the head of the machine, where the fine sand and dust is drawn off. The remaining iron and cinders then pass into the Magnetic Separator, where the iron is retained and the refuse falls out at the tail of the machine. This operation continues until the machine is sufficiently loaded with iron, when the electric current is switched off automatically, and the pure iron falls out into the receptacle provided for it. The lever controlling the switch also operates automatically a deflecting chute, which moves with the switch and thus the refuse and iron are discharged in different receptacles. The entire operation after the waste is thrown into the hopper of the machine is done automatically.

A number of founders using this machine have set it high enough from the floor to allow carts to pass under it, one for iron and one for waste. They have also constructed an elevator to elevate the material from the tumbling mills to the hopper of the machine, which can be done by a chain with buckets, or a chain

with scrapers, or a conveyor. This is only done, however, in large foundries where it is necessary to operate the machine all day. In small foundries, which cast only from 10 to 15 tons, this arrangement is not necessary.

The machine should be set up in the tumbling room or adjoining it. When there is an exhaust in connection with the tumblers, it can be used on this machine, if desired, although it is made so that practically little dust escapes in operation. By using a separator the spaces and holes in tumbling barrels can be greatly enlarged, thus taking less time to rattle the waste through and saving a certain amount of iron dust which is formed by too close tumbling.

A direct current of electricity is necessary in using the machine here illustrated as an alternating current will not operate it. If this is not available the manufacturers at a minimum cost furnish a small dynamo for operating the Separator.

The Use of Plaster of Paris as a Brass Founders' Flux.*

Fluxes are substances which the brass founder usually tries to avoid. In ordinary crucible melting he generally obtains better results without them as a simple covering of charcoal amply suffices for all needs. In some instances, however, there is need for a reliable flux, as those foundrymen who have tried to reclaim by melting such materials as emery grindings, buffings or washings have already discovered. These substances have an exasperating way of agglomerating or, as it is called in foundry language, "balling," when an attempt is made to melt them. Instead of a crucible full of melted metal there is often obtained a little metal in the bottom and a large amount of dross or material which will not melt. The melter often believes that he has not heated his metal hot enough, but a second attempt generally results in the same manner. All that is needed, however, is a suitable flux to prevent the oxidation or dissolve that which is formed.

If the founder has tried some of the fluxes known to the art of brass founding, he quickly arrives at the conclusion that he is better off without them and he is right unless he selects the proper one. It does not follow that a flux which will answer in one case will suit in another. For example, in the melting of nickel or cupro nickel there is no better flux than borax, yet the brass founder quickly learns that it is a useless substance in the melting of brass. Fluor-spar is extensively used in the iron foundry, but it is unsuited for the brass industry. For brass founders' use the writer has found that there is no flux equal to plaster of paris. Its use in this connection, strange to say, appears to be little known.

Before entering into a detailed description of the use of this flux, let us investigate the theory and uses of fluxes in general.

The term *flux* is apparently derived from the Latin word *fluo*, to flow. It is essential, therefore, to come within the full meaning of the term, that a flux should melt. This requirement, however, is not fulfilled as there are certain fluxes which do not melt, although by the reaction which often follows, they are so changed that a melting actually takes place. Strictly speaking, a flux may be defined as a substance which is added to metals during the melting process to purify them.

Fluxes may be divided into three classes, viz.:

1. Fluxes proper or those which melt themselves and act either as an oxide dissolving medium or a covering for the metal or add or subtract elements by chemical reaction.

2. Neutral fluxes, like charcoal, lime, silica, horn chips. Unless chemical reaction follows these do not melt and are the least useful of all. Usually their only agency is to act as a protective covering for the metal.†

3. Metallic fluxes (the classes 1 and 2 are non-metallic). This division consists of metals or alloys which are introduced into the metal in homeopathic amounts to purify them or impart special properties. Silicon copper, phosphor tin, etc., are examples of this class.

In order that the action of fluxes may be readily understood, let us take some yellow brass washings and attempt to melt them in a plumbago crucible. To be sure, some melted metal will be obtained, but one is surprised at the quantity of dross and unmelted metal which is obtained. A large mass of metal simply fritted together is often obtained. Such a phenomenon is caused by the small particles

*Plaster of Paris or, as it is chemically known, Calcium Sulphate is made by calcining Gypsum, a substance found in nature. Gypsum is simply Plaster of Paris plus a certain amount of water (about 10%) which the heat of calcination has driven off. The principal use of Plaster of Paris is in the manufacture of walls for the interior of dwelling houses and it may be purchased in every town at a very cheap price; a consideration which is quite attractive to the foundryman.

†Horn chips or their equivalent introduce phosphorus into the metal and the carbonaceous matter acts as a covering as well.

of metal oxidizing and thus becoming incapable of uniting. The higher the temperature the more the dross. Theoretically, metals may be melted without the formation of any dross and many unsuccessful attempts have been made to carry it out either by melting in a vacuum or a neutral atmosphere. The technical obstacles have always been so great that it is not surprising that such processes have not been a commercial success. In the case of finely divided metal, therefore, some agent must be employed in the melting process to overcome, as much as possible, the tendency to oxidize or to dissolve the oxide when it has been produced. A true flux dissolves the film-like oxide from the surface of each particle of metal and leaves it free to unite with another; a condition which does not readily take place unless the surface is clean. The flux likewise acts as a protective covering for the metal and prevents the access of air or other gases.

As I have previously stated, the experience of the brass founder leads him to abandon the use of fluxes altogether because of his unsatisfactory results. He often realizes, however, the need of such an agent could one be found. He tries borax and quickly discovers that it is of little use in his case. Even were it quite cheap it would soon be abandoned as a very high heat is required to render it fluid. At the temperature of melted brass borax is scarcely more than viscous and does not permeate the spaces between the particles of metal. At a heat which renders borax fluid the crucible is rapidly attacked.

Glass, another in the list of fluxes, is even worse than borax. Fluor-spar, still another, melts easily but quickly corrodes the crucible on account of the affinity of fluorine, an element which it contains, for silica. Salt is often used, but gives off choking fumes and does not form the fluid slag that is necessary. The crucible is also attacked. The basic fluxes such as soda ash or a mixture of soda ash and sand likewise attack the crucible in a violent manner and render their use an expensive consideration.

The ideal flux for brass founders' use should have the following properties, viz.:

1. It should be cheap.
2. The melting point must be low enough so that a fluid slag will be obtained.
3. No obnoxious fumes should be given off.
4. The specific gravity must be lower than that of the metal upon which it is used.
5. No injurious elements should be introduced into the metal by it.

A flux which answers all these conditions, except possibly the last, is found in plaster of paris. Sulphurous fumes are given off in small quantities but, as far as can be discovered, they have no injurious influence on the metal. Indeed, this flux, at my own suggestion, has been employed for some time for fluxing washings in one of the large brass rolling mills, and I am informed that no deleterious effects can be traced to it. In fact, the metal appears to roll as well as that made without the plaster of paris. If no harm is done in the case of the metal used for rolling, it certainly should not be injured for sand casting work.

I do not advise the use of plaster of paris in ordinary melting when new metal, or that consisting of large masses, is employed. It is in the melting of such materials as washings, skimmings, buffings or grindings that its use is advocated.

The method of using this flux is as follows, viz.: Add four or five pounds to one hundred pounds of metal, either before the crucible is put into the fire or after it has been in for some time. It is better, however, to have all the flux in the crucible before the metal begins to melt. If possible, it is conducive to better results if the plaster of paris is mixed with the metal and the whole added to the crucible at the same time. Such a procedure insures a more intimate contact with each particle of metal. One need not have any fears about getting a little more than is necessary as no harm follows and the flux may be used over again. When the metal is melted and the mass has arrived at a state of complete fluidity, the crucible may be removed from the fire and the whole mass, flux and all, poured into the ingot molds. The flux rises to the top and when cool everything leaves the mold in an excellent manner. Of course the slag may be skimmed off if desired, but as it is usually difficult to completely remove the liquid mass, the former procedure is advocated. The flux does not adhere firmly to the metal, but a few light blows from a hammer always removes it. The flux may be used over several times. As far as the writer's experience has gone, there appears to be no action on the crucible, a feature of the utmost economic importance.—[Edwin S. Sperry in *Aluminum World*.

The foundry of Heywood, Wilson & Co., at Fitchburg, Mass., has been bought by M. J. Perault of that city, who will conduct it in connection with his other foundry.

Early Days in the Stove Industry.

Joseph A. Barford, one of the oldest stove plate molders in the country, in a recent issue of *The Iron Molders' Journal* writes some interesting reminiscences of the early days in stove founding, from which we have selected the following. It seems that a hundred years ago the boys were started at the molding trade at a rather early age, Mr. Barford's father having entered the foundry in 1805 when he was twelve years old. All the stove plate castings manufactured at that time were molded at the blast furnace and cast with direct metal. The boys, however, were not apprenticed to the proprietor of the blast furnace, but to a journeyman who, for a consideration, undertook to teach them the "art and mystery" of iron molding. No apprentice served more than two years and was always paid for what he made. At the opening of the nineteenth century the stove industry had scarcely made a beginning, and what few plates were made at the blast furnace were cast in open sand. Such was the case when the elder Barford began his apprenticeship at Batsto Forge, Cumberland Co., N. J., but a couple of years later a New York gentleman brought along the patterns for a box stove intended for wood burning. The castings for this were made in flasks, and is believed to have been the first set of stove castings so made in this country. In 1834 the elder Barford left New Jersey and settled at the Juniata Furnace, in Pennsylvania. He worked at eight different furnaces in that neighborhood and out of these, six of them cast stove plate direct from the blast furnace. Of course, under such circumstances, there was no regular time for pouring off the "heats," the furnace being tapped day or night, Sunday included. The men were divided into three shifts, and those whose duty it was to cast at night slept at the furnace. Molders at that period had to do all of their own work, daubing their own ladles, cleaning their own castings, filing them up, and piling them on the warebank, as it was called, ready for shipment. The castings were not mounted at the furnaces and when an order came in they had to lay it out themselves.

For facing the molds, the molders used a mixture of flour and charcoal, the boss furnished the flour and the molder pounded his own charcoal. Work was paid for by the ton, but the molders never had a pay-day, as they were reimbursed in store orders, and every furnace had its own store which was the only place at which the employes could deal. Once in a while a little money was paid out but this was seldom. To show the scarcity of ready cash, one day a molder went up to the boss and asked him for some money, when this individual looked at him with astonishment and with an oath, exclaimed, "Why, it is only two weeks ago that I gave you half a dollar, and here you are, back again." The molder in question was a married man with a family to support, yet such instances were by no means exceptional.

Conditions were pretty much the same at all the blast furnaces. The last one worked at by the younger Barford being the Isabel Furnace, in Chester Co., Pa., where in 1840 he made his first stove—a nine-plate wood stove, the design of which will be readily recalled by any of the old timers. It was at this furnace that Henry C. Posey, later becoming a member of Orr, Painter & Co., learned his trade. The name "nine-plate" was supposed to indicate the number of plates used in the construction of stoves, but was somewhat erroneous as the nine-plate stove in reality contained eleven plates, if we include the oven doors, which would make the different castings count up as follows—top, bottom, front, back, top and bottom oven plates, two sides, one side oven plate and two oven doors. The patterns used in the blast furnace foundries were made of wood bound with strips of wrought iron. The bottom oven plate, which had to withstand the heat was nearly one-half inch thick, the top oven plate being a little thinner while the bottom was also about one-half inch thick. The other castings were not made quite so heavy. There was no fire brick used, the plates forming the fire box. These were plain stoves, carrying no carving or other decorations. While wood patterns were used at the blast furnaces, in Lancaster, Philadelphia and other stove centers, iron patterns were employed at an earlier date.

To show that the molders, even at this early day, were afflicted with something of an appetite which is known even to this day, and would go to a great length to satisfy it, the following is related: Molders liked whisky but the only thing which would pass current at the tavern besides money was nails. As before said, money was a scarce commodity and a keg of nails cost a molder $5.00 at the company's store, although they were only allowed $2.50 for this at a saloon. Such barefaced robbery, however, did not deter them from quenching their thirst, but it cost a lot to get a

"skate on" upon a nail basis. Mr. Barford continues:

"In 1841 we moved to Lancaster, Pa., where a man from Vermont, named Hathaway, had started a foundry with a capacity of fourteen molders. My father, with his four oldest sons and a son-in-law, named Robert Stratton, made the Hathaway Cook, the first flat-top made in the country. The stove was sold to the farmers in Lancaster county and delivered by the proprietor with a horse and wagon. This was the first foundry and first cupola I ever saw. We worked at two different furnaces after that, but they were equipped with cupolas, which were then coming more in vogue.

"In the summer of 1847, I got tired of working around the blast furnaces in the country districts and was seized with the nomadic instinct of our craft. One Sunday my parents went to church after having sent me, as they thought, to Sunday-school. Instead of going I hid in the bushes until they were clear of the house, then I returned and bundled up my wardrobe. It was not very extensive, for a big cotton handkerchief held it all. With this meager outfit I started for Pittsburg. I had no money to pay my way, but two men who went with me paid it for me. I worked seven weeks in Pittsburg for a dollar and a quarter per day and was thus enabled to earn enough to pay these men back. I had a brother working in Philadelphia, and when he found I had left home he wrote me to come to Philadelphia where he had a job for me. He sent money to pay my fare, for I had none myself, and I arrived in the City of Brotherly Love in September, 1847, and got a job in Warnoch & Liebrant's shop at Noble street wharf. That shop had just started up six days before. The same firm had another shop at Sixth and Germantown Road. Archie Lawrence, afterwards proprietor of the Liberty Stove Works, was superintendent of both shops. He took my brother and me up to the old shop, which we reached about 9 o'clock in the morning. I will never forget the surprise I got that morning. When we entered the shop I noticed a lot of work on the floors, and turning to Mr. Lawrence, remarked, 'You did not take off a heat yesterday, I see.' 'Oh, yes we did,' he replied, 'we run a heat every day.' The molders had more work up at this hour in the morning than I had seen put up for a day before, so my feelings can be imagined. I found out that the molders went to work as early as 2 and 3 o'clock in the morning. The first chance I got to speak to my brother, I said, 'Tom, I'm going back home. I can never work like that.' He finally prevailed on me to stay and I went to work on two complete stoves, commonly known as step stoves, at $1.25 apiece. My brother had the size larger at $1.50 apiece. We went to work about 4 o'clock in the morning, but some were there much earlier. We did not get paid in full every week. We had a book account and drew a part of our earnings every Saturday and left the rest stand until Christmas time, when a settlement was made and we were paid in full. As we generally had a shut-down of seven or eight weeks every winter, this money came in handy."

Thin Brass Castings.

Under this head the writer classifies all brass work from one-half to one-sixteenth of an inch in thickness. The difficulties that beset the molder on thin work are: Scabbing or cutting, causing dirty castings; blowing, when a hard or wet spot in the mold prevents the metal running and squeezing down, which shuts off a portion of the casting completely. Pouring too cool and pouring too slow are also fruitful causes of failure in thin work.

On a plate ½-inch in thickness, and say 26x 18 inches, the chief cause of failure, with the ordinary fine sand used by brass founders, is scabbing. This generally occurs on the nowel side of the casting in the direct path of the metal, and is caused by hard ramming or using metal too hot. A casting of this thickness can be poured cool. The gates should be broad and thin, the metal skimmed clean, started into the mold in a moderate stream, and immediately increased so as to fill up the head of runner, which must be kept full until the mold is filled. If this is not done, although the mold may not scab, the casting will probably be dirty.

When ramming this mold the nowel is the part where the most care must be taken. The molder must regulate his use of the rammer by the depth of sand over the pattern. The pene should never be used over the same. A nowel 2½ inches in depth is quite deep enough for this work. The sand should be well tucked around the pattern, the pene being used all around the edges to give a good firm joint, and the ramming finished by going over it once and lightly with the butt rammer. After bedding on the bottom board a thin vent wire can be used with advantage.

No special precautions are necessary with the cope, the danger of scabbing being much less on cope than nowel. The sand must be

rammed sufficiently hard to withstand handling without "dropping out." It must be well packed under the bars and vented to carry off the gases, and after lifting off look for hard, soft or wet spots over the bars. These should be dug out and filled in and the whole slicked over with the trowel.

There is very little danger of blowing with a mold rammed as above, but it may be "squeezed down." While this will never proceed so far as to shut off a portion of the casting it may give it an uneven thickness or crush in the sides; indeed, these two defects would likely go together. Another danger from squeezing is the dropping of a portion of the cope after closing and when clamping or weighting. A fruitful cause of this trouble, especially with wooden flasks, is an ill-fitting cope—a rocking cope should never be rammed up. When clamps are to be used on such a mold they should be tightened on before ramming the cope; or, if weights are used, the cope must be straightened. If this is not possible, the rocking corners should be blocked up with wedges which may be carefully tapped to place after closing and before weighting the mold.

When we come to thinner work, say ⅛ inch in thickness, squeezing is the most formidable enemy we have to contend against. Not that a casting of this thickness will not scab; it will, but not quite as readily as the one just considered. The remarks on soft ramming of nowel apply just as much to this as the heavier casting, but if followed venting of nowel is scarcely necessary. Blowing is, however, a thing to be considered, as it will cause holes in so light a casting. Too wet sand may be the cause, so while, to use a molders' expression, the sand need not be "as dry as powder," it should not be too wet.

A casting ⅛ inch in thickness will not need the metal "jumping hot." A bright cherry is the right heat, and it should be poured rapidly. A casting 10 inches wide, 18 inches long and ⅛ inch thick, inclined 3 inches from the pouring head will run easily with one pot, if proper precautions are taken to prevent squeezing.

In laundry machinery we often find examples of this class of work; coin operated machines also use thin brass castings. Generally these are small, but occasionally plates, about 10 by 14 inches square and less than ⅛ inch thick, are needed, which are furnished with numerous slots, holes, pins, lugs and grooves. The pins, lugs and grooves merely require a proper lifting of cope and drawing of pattern, but the holes have to be clear and free from burrs and strain. These plates are made in the ordinary iron flasks, and it is desirable to use both top and bottom boards. The bottom boards must be solidly bedded; the top board should be a good one, and the manner of bedding on is important. After the cope is rammed and struck off a very little sand should be thrown over, and the board be scrubbed down until it has a solid bearing on both the sand and the upper edges of the flask. Sufficient weights must be placed on the molds, when pouring, to hold them down without aid from the foot; otherwise, on removing the foot to place on the next mold, the metal may flash and film the holes, without any visible sinking of the head. It is possible to spoil an entire heat in this manner.

Castings thinner than those we have been considering rarely scab; squeezing and pouring too cold or too slow are the things to be guarded against. Work 1-16 inch in thickness must be poured as hot as possible. The metal must reach the boiling point, and be, as the furnaceman would say, "jumping hot" before it is removed from the furnace, and the work of skimming and carrying to the molds must be done as rapidly as possible. Some molders are more successful in running such work than others, being less nervous.

Sometimes first-class men are failures on such work. They know how it should be done, but for the life of them they cannot do it. After pouring one or two molds they become nervous, hesitate at the critical moment and make work for the furnaceman, to their own utter disgust. The pouring of such work must be done rapidly, the metal being shifted from mold to mold as quickly as possible. The spout of the pot is rested squarely in front of each runner head and the metal unhesitatingly tipped in, thus instantly filling the mold.

When small light castings are to be cast in the same flask with other work of a heavier character, the light pieces should be placed at the bottom end and in such a manner that the metal will have a straight run into them. Such things as name plates thus run much better when placed squarely across the lower end of mold, at the bottom of main runner. If placed at the side of the same, their gates form a right angle with the runner, the force of the metal is checked and the chance of loss greatly increased.—C. Vickers, in *American Machinist.*

Letson & Burpee will build a 25x50 feet addition to their foundry at Fairhaven, Wash.

Dressing Castings.

Brass or iron castings ought to present an attractive appearance to the eye and should in no case have to depend on after treatment to bring them within recognizable limits. This factor is recognized with other commercial commodities and it is one our jobbing foundries might with profit take into consideration. In an endeavor to attain a higher standard of economy and excellence, full advantage must be taken of every aid that will tend to improve. Therefore, a few remarks on the trimming of castings are presented—not with the idea of saying all that may be said on this subject, but rather with the hope that these necessarily scattered remarks may offer some suggestions.

It is granted that the appearance of a casting should be pleasing as it leaves the foundry. but can it always be said that this is so. Apart from eyesores, due to defective molding, we see occasionally castings equally disfigured by careless or slovenly trimming. Bad in iron this fault is far worse with brass castings. Small castings, especially yellow metal ones, are distorted in the vise; hexagon, square or rounds, are not kept true to shape when being trimmed over on the emery wheel. These and similar instances are familiar occurrences in daily practice; and in small details of this kind may be found opportunity to advance the quality of many foundry products.

It is well recognized that the best quality castings are cheapest, and the founder turning out such is the one whose order books in the long run are likely to be best filled. Good facilities are cheaper—and more economical than makeshift ones. The fitting up and tools of many cleaning rooms seem to have been installed on the makeshift plan rather than otherwise. Not a few are mere sheds,—some have the open sky for roof, which to say the least is rather disagreeable in stormy or wintry weather. The chief tools in such shops seem to be hammers and chisels, mechanical appliances are not given much thought and the castings consequently suffer in appearance. Naturally the tools required and the conveniences for work vary greatly with the class of castings turned out. Supposing these to be of a very light and small type, then the chief tools required will be convenient benches and vises, a good supply of files and small coring tools, emery wheels and tumblers.

It goes without question that for small work the less trimming necessary the better the result, in other words, the higher the quality of the molding the more perfect is the product. This is particularly the case in light brass work, such as cocks, valves, fire, steam and water fittings. In this class of work it does not pay to put in much trimming; it is far cheaper and easier to turn out smooth clean castings than to try and bring a "finned" or rough casting into proper shape. Assuming that the molding has been properly done, then for small brass castings there are many devices which easily lend much to the beauty of a casting. It is better to blow all cored work, that is, to break the castings off the gate while hot and dip them at a certain temperature into cold water. This if caught at the right moment has the effect of blowing out the core and leaving the casting without a particle of sand adhering to it. Castings so treated do not need any treatment in the tumbling barrel, but after the gates are ground off may, to further improve their appearance, be put through one of the two following methods:

(1) A water-tight rattler constructed of hard wood, or a cast iron one wood-lined. The castings are packed in this with coarse, sharp or gritty sand and about a pailful of water. Care must be taken in packing to allow plenty of sand and to add each time of rattling only castings of fairly uniform weight. After twenty minutes or half an hour of this the castings are taken out and the sand washed off in cold running water, then plunged into hot water, taken out and left to dry. This treatment properly carried out gives valve bodies and similar articles which are not afterwards machined or filed, a dead bright and smooth appearance, with comparatively little trouble.

(2) The second method is that of dipping in acids. This though a comparatively simple process in the case of yellow metal castings becomes more complicated when alloys consisting of three or four constituent metals are used. For instance, when copper, tin and zinc are present in the mixture, it is advisable to use two acids, namely, Nitric and Hydrochloric. In the writer's hands this practice has met with the best results, the castings are first dipped into nitric, from this into hydrochloric and well washed in water and dried off in sawdust. If lead is present in the mixture a discolored film is left on the surface of the casting which detracts from its appearance. It will be seen that for small brass castings of the kind under discussion little so-called trimming is actually done and the less required the better. The aim is to secure properly molded castings, then break off the gates, blow them hot, grind over the gate mark and either scrub the rattler with sand or dip in acid.

But all brass castings will not permit of blowing or breaking the gates off hot and in such cases the best results are to be obtained by a band saw and ordinary tumbler. A good band saw will get through a large number of gates a day and the rattling will save much brushing. Cores have to be got out in the usual way and after wire brushing, grinding at gate and joints, the casting may go either through the acid or scrubbing process. For cutting off gates band saws are far ahead of gate cutters and of course there can be no comparison between these tools and the laborious hammer and chisel. This saw, the emery wheel, and rattlers should be speeded up to as high a rate as the class of work will stand. Coming onto heavier work in brass, iron or steel there are many tools or devices that effect much saving of labor and improve the appearance of a casting. Of these may be mentioned pneumatic hammers for chipping off fins or scales, as in the case of an annealed steel casting, hand tools such as heavy and light hammers—varieties of chisels, sets, a good choice of files, wire brushes, coring bars and the like. There should be a good future for emery wheels attached to flexible shafts.

Sand blast has many advantages for cleaning the scale and adhering-sand from castings and has been more or less extensively adopted. Iron castings are treated in acid solutions or pickles as they are technically termed. These are usually weak sulphuric acid in which the castings are allowed to soak for some time—or in other methods the acid is ladled over the casting at frequent intervals and finally the casting is well soused with water. Another so-called pickling solution used is hydrofluoric acid, which is capable of dissolving silica. The sand adhering to castings pickled in this acid is dissolved away. As a rule machinists prefer castings treated in sulphuric, for the acid in this case eats into the skin of the casting and when the latter comes to be machined or turned the tools do not blunt so readily and the working life of a tool is accordingly longer.

The arrangement of a cleaning room is after all more or less a question of environment. The chief aim should be to insure a regular sequence in the progress of the castings. This can readily be accomplished by prearrangement, the chief feature of which should be that the castings in traversing from saw to rattler or bench do not cover the same ground twice and that after its treatment the casting is near the scales and the exit of the foundry.

With regard to the shipping of castings, a matter not at all difficult in the case of large or heavy pieces, this becomes extremely complicated in the case of small and intricate work, the more so if such an order consists of many small details. A method successfully adopted to overcome the confusion and worry attached to sorting out these small details is briefly described as follows: In this case the foundry, a large one by the way, supplied all the castings required in an extensive engineering and constructive establishment and these castings were of an extremely varied character. Each order was given a contract number, which numbers were progressive, starting from zero upwards. A list of all castings, forgings, etc., required to complete each contract was issued to the departments concerned and an order book suitably ruled reserved for each contract. For convenience of the foundry the castings required for each contract were numbered consecutively from one upwards. Thus patterns issued from the pattern-making department are given two numbers, a contract number and a castings number, a label with these numbers is gummed onto the pattern. This label contains also the number of castings required, metal work and any other necessary particulars. An order also containing the same information is handed into the foundry office and entered in the book devoted to that contract number. Each molder is provided with a set of loose figures and it is his duty to impress on each mold made, the casting number. This plan was adopted owing to the fact that though the trimmed castings were fairly easy to identify as regards particular contract, it was an extremely hard matter to assemble all the small details of that contract. Knowing the contract number and each detail having its casting number cast on in neat and small figures, the shipping clerk has in case of doubt simply to turn up his order book and the requisite information is immediately at hand. PERCY LONGMUIR.

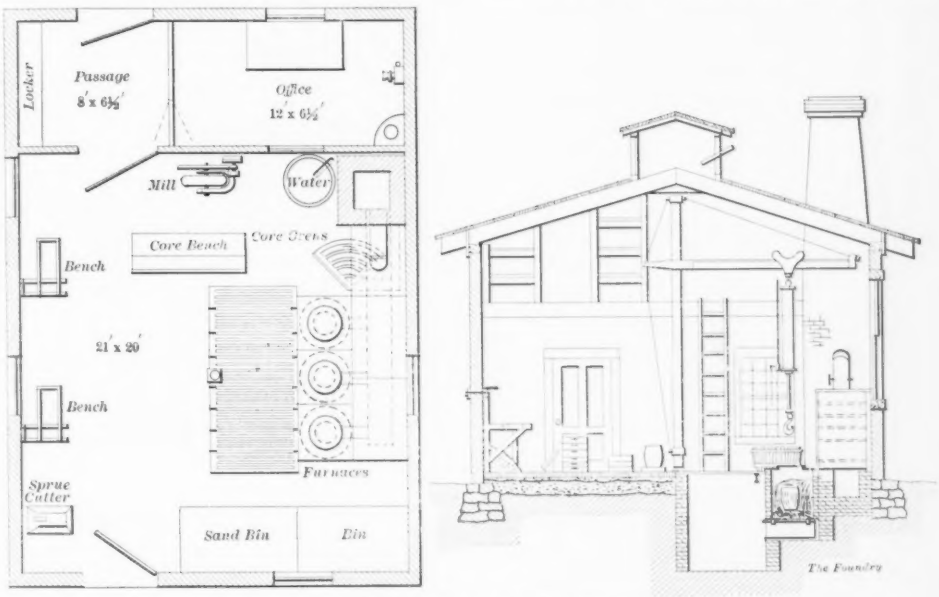
A Good Idea.

A new roof has been placed on the Woodruff foundry and hereafter the employes of that department will not have to knock off work with every little shower.—Salem (O.) *Correspondent.*

John Cornthwaite, of Ballard, Wash., has decided to establish a foundry and machine shop at that point. For several years Mr. Cornthwaite has been manager of the West Coast Iron Works.

Equipment for a Small Brass Foundry.

While brass founding can be carried on in the same building as is devoted to iron founding, it is generally more satisfactory to keep these departments separate. Wm. F. Torrey of Quincy, Ill., who says he recently had occasion to lay out a small shop, illustrates in *Machinery* the general plan of same. As will be seen, the building is divided into two sections, the small one being used for an office and the larger for the foundry. In this foundry on the right are three furnaces, with a core oven built over the flue, arranged with a sliding damper which takes part of the waste heat through it to dry the cores. On the left are the benches. Tubs are not much used; they are considered unhandy, as with them the sand cannot be as easily handled. The sand is tempered on the floor and then thrown back against the wall for further use.



PLAN AND ELEVATION OF BRASS FOUNDRY.

One of the features introduced was a crane, with air hoist, so arranged that it could be turned around and cover nearly the entire floor, lifting the pots of melted metal from the furnace and removing the ashes from the pit.

Over the office is a loft with shelves on one side and a space for an electrically-driven air compressor with receiver to supply air for hoisting, dusting, rapping and chipping. The electric motor when not driving the air compressor is used to run the mill for grinding the cinders.

The sketch is of a small-sized foundry, but where more room and benches are needed the foundry can be enlarged in proportion.

To Make Plaster Casts From Life.

To make a plaster cast from the life is a matter of some difficulty, because it has to be done quickly; but there is probably no sculptor who, when he finds a pretty model, does not wish to possess a cast of her face, or arm, or Trilby-like foot. The skin must be well oiled, so that the plaster will not adhere to it; in the case of a hirsute model it is even well to use butter or oleomargarine, and to apply it somewhat thickly.

In taking a mask of the face, the mouth and eyes must be kept closed, and the nostrils must be stopped with wax, through which quills are inserted for the model to breathe through. An arm must be well supported at the wrist and elbow, for the weight of the plaster is considerable, and the special difficulty of the work is due to involuntary movements of the muscles trying to adjust themselves to this weight, which causes the plaster to slip. For the same reason, the more quickly the work is done the better. To make the plaster set quickly, mix some powdered alum with it. Common salt would do, and its use is sometimes advised; but it adds to the adhesive property of the plaster, and more oil or grease must be used, which makes it impossible to attain the nat-

ural texture that a cast from the life should have.

One must decide quickly about the number and shape of the pieces into which the shell is to be divided, so that it may be withdrawn easily from the model. A waxed silk thread is to be used for cutting; but since the shell cannot be made very thick, breakages frequently occur, and much skill is necessary in putting together the pieces of the mould in order to get a cast from them. It is important to see that the interior surface of the mould is coated with shellac to render it less absorptive, and must be freshly oiled before using. It is useful, in addition, to mix a little color in the plaster that is prepared for the cast, so that if even a trace of it adheres to the inside of the mould it will be detected, in which case it is to be carefully removed with a sharp penknife blade, and adjusted in its proper place on the cast; for, as before said, the special beauty of a cast from life is in its natural surface. A very slight addition of yellow and red ochres in powders will give something like the warm hue of flesh.

Everything depends upon quickness, and upon the thorough mixture of the plaster. Plenty of it should be in readiness, and it should be mixed as thick as the water will hold, leaving just an inch or so of water at the top of the bucket.

Novel Traveling Crane Arrangement.

The main machine shop of Mackintosh, Hemphill & Co., Pittsburg, Pa., the well-known builders of heavy rolling mill engines and machinery, is L-shaped, one branch of the L being mostly given up to machine tools and the greater part of the other to the erecting floor. Each section of the L is served by heavy traveling cranes which make the handling of the heaviest castings within the shop a comparatively simple matter, but as the arrangement of the shop buildings and those on adjacent property is such that a railway switch could not be carried into the shop without considerable sacrifice, the problem of crane arrangement so as to admit of economical handling of parts for railway shipment was one that required considerable thought and designing before it was satisfactorily solved.

The solution is as simple as it is novel and is plainly shown in the three accompanying cuts, Figs. 1, 2, and 3. A narrow street separates Mackintosh, Hemphill & Co.'s shops from the adjacent buildings, and through it the railway switch is laid. The switch runs parallel to the branch of the L given up to the erecting floor; consequently the crane tracks for the machine floor run at right angles to the railway switch. These tracks are carried over

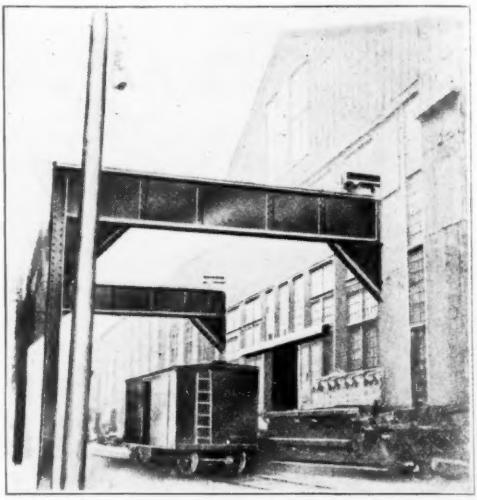


FIG. 1.

the switch as shown in Fig. 1 so that the crane can travel outside of the building and deposit its load directly on a flat car. But this makes necessary an opening of considerable size in the end of the shop which would be incompatible with keeping the interior at the proper

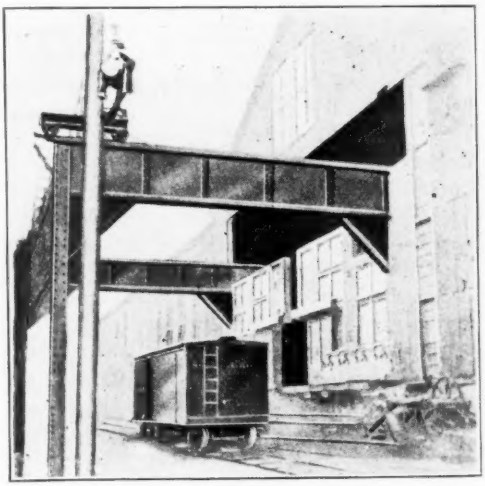


FIG. 2.

temperature for comfortable working in winter. It was, therefore, necessary to provide the opening with a door which can be readily opened when the crane is moved out over the

switch and immediately closed when the necessity for its being opened is removed. The door closing the opening, which is shown closed in Fig. 1, is carried on trucks at the ends, the same as the crane, which travels on the same tracks. In Fig. 2, the door is shown moved over to the left and the opening unobstructed for the passage of the crane. Fig. 3 shows the crane outside of the shop, with the hook directly over the box car which happened to be standing on the switch at the time the photographs were taken.

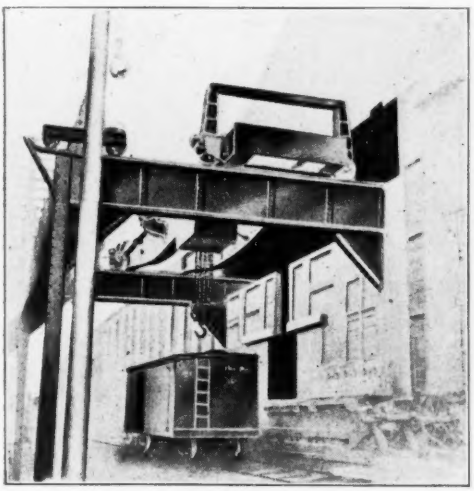


FIG. 3.

The manner of moving the door is simple, the crane being utilized for the purpose. When the door is to be opened the crane pushes it over to the position shown in Fig. 2, and when it is to be closed the crane engages it by means of two latches which draw the door after the crane to the opening and then are disengaged, leaving the opening closed. It will be observed that the opening in the end of the shop communicates by a narrow slit with that made by the sliding door beneath. The chains pass through the narrow opening and the load is carried through the lower door. The opening and closing of the crane runway is accomplished so easily that it is regarded as being of very little trouble, even in winter, when it is quite necessary to close it at each trip of the crane to the outside of the shop when loading a car on the switch. The operations of opening and closing the door, being practically automatic, interfere but little with the crane operator's other duties.

The foundry is located beyond the machine shop and castings from it may be carried directly through the machine shop for shipment or may be machined and then shipped without traversing the same route twice. If, as in the case of engines and rolling mills, it is necessary to transport the parts to the erecting floor for assembling, a transfer is made at right angles from one traveling crane to the other and then back again when the parts are ready for shipment. The adaptation of an old plant to modern manufacturing methods has thus been very well worked out without entailing excessive cost.

In connection with the foregoing description, it may be of interest to some readers to learn that the works of Mackintosh, Hemphill & Co. were formerly known as the Fort Pitt Cannon Foundry or the Fort Pitt Foundry, which in many ways is historically famous. The Fort Pitt Foundry was established about 1810 by Joseph McClurg at the corner of Fifth Avenue and Smithfield Street, the present site of the postoffice and was subsequently removed (1831) to its present site on Twelfth Street and the bank of the Allegheny River.

The Fort Pitt Foundry made cannon for the Lake Erie fleet under Commodore Perry and for the defense of New Orleans during the war with Great Britain, 1812-1814. In those days the cannon were bored in primitive boring mills driven by horsepower, old worn-out or blind horses being generally employed for the purpose. Three or four years after, the horses were superseded by a high-pressure steam engine built by Oliver Evans. It was at these works that Lieutenant Rodman, while employed to superintend the casting of a large number of eight-inch guns, invented the famous Rodman cannon, which owed its superiority to being cooled from the interior by a stream of water circulating through the core. The first Rodman cannon was cast in 1849, and subsequently many hundreds were made, which were used in the Civil War. The largest one made had a bore of twenty inches and weighed, when finished, about fifty-eight tons. The first locomotive built west of the Allegheny Mountains was constructed at these works in 1841.—*Machinery.*

The Morse Petroleum Gas Generator Co., of Pueblo, Colo., intend to erect a manufacturing plant in that city for making oil burning devices.

The Sterling Wrench & Tool Co. are building shops at Sterling, Ill. The foundry is now under construction. E. T. Warn is manager of the new concern.

Influence of Cupola Practice Upon the Constituents of Cast Iron.

In my opinion there is no question but that the proper handling of the cupola exerts a great influence upon the chemical constituents of cast iron. The length of time the melted iron remains in contact with the fuel, the amount of air and pressure of blast have a great influence on the percentage of carbon in the mixture. I have found this to vary so much in different cupolas that the same identical mixture could not be identified as the same product. I discovered this fact before I knew anything about chemistry or the chemical analysis of iron.

I have used a mixture of iron in one cupola which was perfectly satisfactory in every way, and all who saw the finished castings admired its fineness, and when polished the surface had the appearance of tool steel. Machine tools working on these castings could be speeded up to a very high limit and the shrinkage was very low. One of the foundrymen in the neighborhood asked me to give him the mixture which I employed, but when he tried this he obtained an entirely different result from what I secured in the cupola I was using. The iron was granular and hard, would not take finish and dulled the tools in the machine shop.

When advised of this I thought that my friend had probably made an error in charging his cupola, so I went over and took hold myself, but obtained no better results than he did. After making several experiments I came to the conclusion that this could only be accounted for by the fact that the two cupolas were not operated under identical conditions.

I have no trouble with hard iron, although I do not use any No. 1 iron in our mixtures, and 50 per cent of scrap. We are making some castings 1-12 of an inch thick, which will machine and drill readily and take a beautiful finish whenever the cupola is properly operated. Many foundrymen have the idea that if they secure the services of a chemist, this is all that is required to obtain good, cheap iron, and that it makes no difference how they throw this into the cupola or take it out. In this they are mistaken, for it is necessary for the foundryman to understand how to operate his cupola and he must pay attention to it before he can get the full benefit of chemistry in connection with the casting of iron. F. W. STICKLE.

Production of Foundry Iron and Steel Castings for 1901.

James M. Swank, general manager of the American Iron and Steel Association, in the annual statistical report of that body for 1901, shows that 3,186,348 tons of foundry iron were made during last year against 3,037,689 tons for 1900. In addition there were produced during the year 1901 360,147 tons of charcoal iron and 256,532 tons of malleable Bessemer iron. The tonnage of castings made from furnace metal, or cast direct, is a small feature, amounting to only 8,522 tons against 8,703 tons in 1900. The state of Pennsylvania takes the lead in this class of castings, making 5,301 tons in 1901, an increase of 893 tons over 1900, 3,193 tons of this amount being credited to Allegheny County.

In the production of steel castings, which for 1901 amounted to a total of 317,570 gross tons Pennsylvania takes the lead with 110,302 tons or nearly 35 per cent of the whole. Illinois is a close second with over 32 per cent, Ohio being next with a little over 8 per cent. 301,622 tons were made by the open-hearth process, 206,681 tons being acid and 94,941 tons basic. Only 6,764 tons of steel castings were made by the Bessemer process and 9,184 tons by the crucible or other processes.

Valuable Profession.

L. T. Kline states that he will accept two apprentices at his foundry and machine shop, one to learn the molder's trade and the other the machinist's. Boys from 16 to 18 years of age are preferred. This is an excellent opportunity for a couple of ambitious young men to learn a very valuable profession.—Alpena (Mich.) *News*.

The Union Iron Works, of Oshkosh, Wis., under the direction of H. C. Doman & Co., proprietors, contemplate the erection of a new plant for the manufacture of gas engines and general foundry work, which will cost about $30,000. The machine shop will be 48x208 feet, and a separate structure will be erected and equipped for the foundry and pattern shop, which will be 40x208 feet in dimensions.

The McGahey Engine Co., of Elkton, Va., will build a foundry and machine shop, each to be 80x140 feet, and furnished with modern equipment for the manufacture of a new automatic Corliss engine, designed by C. R. Gahey.